UNITED STATES DISTRICT COURT

NORTHERN DISTRICT OF CALIFORNIA

ILLUMINA, INC., et al.,

Plaintiffs,

v.

BGI GENOMICS CO., LTD, et al.,

Defendants.

Case No. 19-cv-03770-WHO

Case No. 20-cv-1465-WHO

ORDER RE POST-TRIAL MOTIONS; ADMINISTRATIVE MOTIONS TO SEAL

Re: Dkt. Nos. 529, 530, 574, 575, 576, 577, 578, 579, 580, 581, 598, 602, 603, 604, 608, 611

Plaintiffs Illumina Inc. and Illumina Cambridge Ltd. (collectively, "Illumina") and defendants BGI Genomics Co., Ltd., BGI Americas Corp., MGI Tech Co., Ltd., MGI Americas, Inc., and Complete Genomics, Inc.'s (collectively, "Defendants") have filed six post-trial motions. Illumina moves for judgment as a matter of law, permanent injunction, attorney fees and enhanced damages, and prejudgment interest. Defendants move for judgment as a matter of law and a new trial. For the reasons explained below, Illumina's motion for judgment as a matter of law is **GRANTED in part and DENIED in part.** Its motions for permanent injunction and prejudgment interest are **GRANTED.** Defendants' motions for judgment as a matter of law and a new trial as well as Illumina's motion for attorney fees and enhanced damages are **DENIED.**

BACKGROUND

Illumina filed its original complaint in *Illumina Inc., et al., v. BGI Genomics Co., Ltd.*, et al., Case No. 19-cv-03770 (N.D. Cal.) ("*Illumina I*") on June 27, 2019. Dkt. No. 1.[1] The first

[1] All citations to the docket refer to the docket in *Illumina I*, unless otherwise specified.

amended complaint in *Illumina I* asserts infringement of two patents against Defendants' product, StandardMPS: U.S. Patent Nos. 9,410,200 (the "'200 Patent") and 7,566,537 (the "'537 Patent"). Dkt. No. 52 ("*Illumina I* FAC") ¶¶ 2, 33–44. Defendants filed counterclaims to *Illumina I* FAC, alleging that Illumina's DNA sequencing systems infringe claims 1–3 and 5 of its patent, U.S. Patent No. 9,944,984 (the "'984 Patent"). Dkt. No. 94 ("*Illumina I* Answer") ¶ 10. On February 19, 2020, Illumina filed a motion for preliminary injunction. Dkt. No. 84-4 ("*Illumina I* PI Mot.").

On February 27, 2020, Illumina filed a complaint in *Illumina Inc., et al., v. BGI Genomics Co., Ltd.*, et al., Case No. 20-cv-1465 (N.D. Cal.) ("*Illumina II*"). 1465 Dkt. No. 1. ("*Illumina II* Compl."). Illumina alleged infringement of three patents against Defendants' products, StandardMPS and CoolMPS: U.S. Patent Nos. 7,777,973 (the "'973 Patent"), 10,480,025 (the "'025 Patent"), and 7,541,444 (the "'444 Patent"). *Id.* On the same day, Illumina filed a motion for preliminary injunction in that case. 1465 Dkt. No. 11 ("*Illumina II* PI Mot."). On June 13, 2020, I granted both motions for preliminary injunction. Dkt. No. 185 ("PI Order").

On August 27, 2021, I denied Defendants' motion for summary judgment that the '973 Patent is invalid for failure to satisfy the enablement and written description requirements under 35 U.S.C. § 112. 1465 Dkt. No. 469 ("MPSJ Order"). In the same order, I granted Defendants' motion for summary judgment on the CoolMPS products' non-infringement of the '025 Patent. *Id.* On September 9, 2021, I granted Illumina's motion for summary judgment that (1) its accused products do not infringe the '984 Patent; (2) Defendants' StandardMPS products directly infringe all asserted claims of the '537 Patent, the '200 Patent, the '025 Patent, the '973 Patent, and the '444 Patent; (3) Defendants' CoolMPS products directly infringe the asserted claims of the '973 and '444 Patents; (4) all of the asserted claims of the '537, '200, '025, '973, and '444 Patents are not invalid as anticipated; and (5) the '444 Patent is not invalid for lack of written description or enablement. Dkt. No. 424 ("MSJ Order") at 19, 20, 25.

A jury trial took place from November 15, 2021, through November 22, 2021. At trial, Illumina asserted induced, contributory, and willful infringement of claim 3 of the '444 Patent, claim 13 of the '973 Patent, claims 1, 4, and 6, of the '537 Patent, claims 11 and 19 of the '200 Patent, and claims 1, 9, 27, 31, 33, 34, 42, 47, and 50 of the '025 Patent (collectively, the

"Asserted Claims" of the "Asserted Patents"). I had determined that the Defendants had directly infringed the Asserted Claims of each of the Asserted Patents. Dkt. No. 521 ("Final Jury Instructions") at 17–20. Defendants contended invalidity of the Asserted Claims on the basis that they were obvious or failed to satisfy the written description requirement or enablement requirement. *Id.* at 21. At the close of all evidence, Illumina moved for judgment as a matter of law on its affirmative case regarding all claims of indirect infringement and willful infringement. Dkt. No. 529. It also moved for judgment as a matter of law on its rebuttal case regarding the validity of all Asserted Claims. Dkt. No. 530. Defendants also moved for judgment as a matter of law on all the issues. Dkt. No. 540 at 724; Dkt. No. 542 at 1155. I allowed all issues to pass to the jury.

The jury deliberated for five days and reached a verdict on November 30, 2021. The first issue was whether Illumina had proven by a preponderance of the evidence that Defendants had induced and/or contributed to the infringement of its patents. The jury found that Illumina had proven that Defendants had induced and contributed to the infringement of the '444 Patent and the '973 Patent. Dkt. No. 550 ("Verdict") ¶¶ 1–4. It found that Illumina had proven that Defendants had induced the infringement of the '537 Patent and the '200 Patent but it found that Illumina had not proven that Defendants had contributed to the infringement of these two patents. *Id.* ¶¶ 5–8. The jury also found that Illumina had not proven that Defendants had induced or contributed to the infringement of the '025 Patent.

The second issue was whether Defendants had proven by clear and convincing evidence that the asserted claims of Illumina's patents were invalid. The jury found that Defendants had proven that claim 3 of the '444 Patent and claim 1 of the '025 Patent were invalid as obvious. *Id.* ¶¶ 11, 21. It found that Defendants had not proven that claim 13 of the '973 Patent, claims 1, 4, and 6 of the '537 Patent, claims 11 and 19 of the '200 Patent, and claims 9, 27, 31, 33, 34, 42, 47, 50 of the '025 Patent were invalid as obvious or invalid for failure to satisfy the written description requirement or the enablement requirement. *Id.* ¶¶ 12–23. It also found that Defendants had not proven that claim 1 of the '025 Patent was invalid for failure to satisfy the written description requirement or the enablement requirement. *Id.* ¶¶ 22–23. Third, the jury

found that $8 million in damages would fairly and reasonably compensate Illumina for Defendants' infringement from early 2014 through June 2020. *Id.* ¶ 24. Finally, the jury found that Illumina had proven by a preponderance of the evidence that Defendants' infringement was willful. *Id.* ¶ 25. The parties filed their respective post-trial motions on January 11, 2022. The motions hearing took place on March 2, 2022. Dkt. No. 663 ("Hearing Tr.").

DISCUSSION

I. ILLUMINA'S MOTION FOR JUDGMENT AS A MATTER OF LAW

Illumina renews its motion for judgment as a matter of law ("JMOL"), or in the alternative a new trial, that Defendants have failed to meet their burden of proving by clear and convincing evidence that Claim 1 of the '025 Patent and Claim 3 of the '444 Patent are invalid as obvious under 35 U.S.C. § 103. Dkt. No. 579 at 2. For the reasons below, there is substantial evidence to support the jury's conclusion regarding Claim 3 of the '444 Patent but there is not substantial evidence to support the jury's conclusion regarding Claim 1 of the '025 Patent.

A. Legal Standards

1. Judgment As a Matter of Law

The Federal Circuit "reviews decisions on motions for JMOL, motions for a new trial, and evidentiary rulings under the law of the regional circuit." *InTouch Techs., Inc. v. VGO Commc'ns, Inc.*, 751 F.3d 1327, 1338 (Fed. Cir. 2014). In the Ninth Circuit, judgment as a matter of law is appropriate where "the evidence, construed in the light most favorable to the nonmoving party, permits only one reasonable conclusion, and that conclusion is contrary to that of the jury." *White v. Ford Motor Co.*, 312 F.3d 998, 1010 (9th Cir. 2002). This standard requires a court to uphold "any jury verdict supported by substantial evidence," substantial evidence being "evidence that a reasonable mind would accept as adequate to support a conclusion." *Callicrate v. Wadsworth Mfg., Inc.*, 427 F.3d 1361, 1366 (Fed. Cir. 2005). Neither a "mere scintilla" of evidence, nor pure speculation, is enough to sustain a verdict against a motion for JMOL. *Lakeside–Scott v. Multnomah Cty.*, 556 F.3d 797, 802–03 (9th Cir. 2009).

2. New Trial

Under Federal Rule of Civil Procedure 59(a), a trial court "may grant a new trial, even

though the verdict is supported by substantial evidence, if the verdict is contrary to the clear weight of the evidence, or is based upon evidence which is false, or to prevent, in the sound discretion of the trial court, a miscarriage of justice." *United States v. 4.0 Acres of Land*, 175 F.3d 1133, 1139 (9th Cir. 1999) (internal quotation marks omitted); *accord Wordtech Sys., Inc v. Integrated Networks Sols., Inc.*, 609 F.3d 1308, 1313 (Fed. Cir. 2010). In considering a motion for a new trial, a court "has the duty to weigh the evidence as the court saw it, and to set aside the verdict of the jury, even though supported by substantial evidence, where, in the court's conscientious opinion, the verdict is contrary to the clear weight of the evidence." *Molski v. M.J. Cable, Inc.*, 481 F.3d 724, 729 (9th Cir. 2007) (internal quotation marks and alterations omitted). The Ninth Circuit "review[s] [a] district court's ruling on a motion for a new trial under Rule 59(a) for an abuse of discretion." *E.E.O.C. v. Go Daddy Software, Inc.*, 581 F.3d 951, 962 (9th Cir. 2009). The denial of a motion for a new trial is reversible "only if the record contains no evidence in support of the verdict or if the district court made a mistake of law." *Id.* (internal quotation marks omitted).

3. Invalidity on the Basis of Obviousness

35 U.S.C. § 103 prohibits the issuance of a patent when "the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains." 35 U.S.C. § 103.

Obviousness is a question of law based on underlying factual determinations. *Insite Vision Inc. v. Sandoz, Inc.*, 783 F.3d 853, 858 (Fed. Cir. 2015). Each claim in an issued patent is presumed valid. 35 U.S.C. § 282. To invalidate a patent on the basis of obviousness, the challenging party must prove obviousness by clear and convincing evidence. *Oakley, Inc. v. Sunglass Hut Int'l*, 316 F.3d 1331, 1339 (Fed. Cir. 2003). The underlying factual inquires include: (i) "the scope and the content of the prior art;" (ii) "the level of ordinary skill in the art;" and (iii) "the differences between the claimed invention and the prior art." *Graham v. John Deere Co. of Kansas City*, 383 U.S. 1, 17 (1966). Secondary indicators such as "commercial success, long felt but unsolved needs, [and] failure of others," that can "give light to the circumstances surrounding

the origin of the subject matter sought to be patented" should also be considered. *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 399 (2007) (internal citations and quotation marks omitted).

Evidence of secondary considerations "may often be the most probative and cogent evidence [of nonobviousness] in the record." *Stratoflex, Inc. v. Aeroquip Corp.*, 713 F.2d 1530, 1538 (Fed. Cir. 1983). "A determination of whether a patent claim is invalid as obvious under § 103 requires consideration of all [of these] factors, and it is error to reach a conclusion of obviousness until all those factors are considered." *Apple Inc. v. Samsung Elecs. Co.*, 839 F.3d 1034, 1048 (Fed. Cir. 2016). "Objective indicia of nonobviousness must be considered in every case where present." *Id.*

B. Claim 3 of the '444 Patent

Illumina asserts that Defendants have failed to meet their burden of proving that Claim 3 of the '444 Patent is invalid as obvious because (1) there is no basis for the jury to find that a person having ordinary skill in the art ("POSITA") who is focused on sequencing would have followed Zavgorodny's suggestion to try his 3'-*O* azidomethyl blocked nucleoside as an antiviral, which requires turning it into a nucleotide by adding a phosphate; and (2) in light of that failure of proof, the secondary indicia of non-obviousness demonstrate that claim 3 is not obvious. *See* Dkt. No. 579 at 2; Dkt. No. 597 at 2.

Claim 1 of the '444 Patent recites,

> "A modified nucleotide molecule comprising a purine or pyrimidine base and a ribose or deoxyribose sugar moiety having a removable 3'-OH blocking group covalently attached thereto, such that the 3' carbon atom has attached a group of the structure—O-Z wherein Z is any of . . . ."

1465 Dkt. No. 1-2 ("'444 Patent") at 85:65–86:35. Claim 3 states, "A molecule according to claim 1 wherein Z is an azidomethyl group." *Id.* at 86:39-40.

First, Illumina asserts that Defendants have failed to meet their burden to show that a POSITA would have been motivated to try the 3'-*O*-azidomethyl nucleoside disclosed in Zavgorodny as an antiviral in combination with Kovacs, given that both parties' experts testified that no 3'-*O* blocked reversible terminator has ever been used as an antiviral. Dkt. No. 579 at 19; Dkt. No. 542 at 908 (Metzker Trial Tr.) ("not aware of any reversible terminator at all being used

as an antiviral therapeutics"); *id.* at 1039–40 (Romesberg Trial Tr.) (same). And given that the definitions of POSITA do not mention antiviral drug development and that the '444 Patent is focused on sequencing, Illumina argues that Defendants have failed to satisfy their burden to explain why a POSITA focused on developing DNA sequencing and analysis methods would have even attempted to develop an antiviral drug. Dkt. No. 579 at 19–20; *see* Final Jury Instructions at 22; '444 Patent at 59, Figs. 5 and 6.

As Defendants point out, Illumina's arguments improperly "attempt to import non-existent sequencing limitations into claim 3 and ignore the substantial evidence presented to the jury about all the different applications for which a POSA, including those working in the field of sequencing and DNA analysis, would convert modified nucleosides into modified nucleotides." Dkt. No. 597 at 2. There is substantial evidence to support jury's conclusion that it was obvious to convert the Zavgorodny 3'-*O* blocked nucleoside to a nucleotide for antiviral applications and that this conversion was the most common molecule to make from the Zavgorodny synthon. *Id.* at 1; *see* JTX051 ("Zavgorodny 1991"); JTX007 ("Zavgorodny 2000").

There is no dispute that claim 3 is the broadest claim in all of the Asserted Patents as it simply covers a composition, a modified nucleotide—a single 3'-*O* azidomethyl blocked nucleotide, where the azidomethyl is removable. Dkt. No. 541 at 799, 804–05 (Metzker Trial Tr.); Dkt. No. 542 at 1075 (Romesberg Trial Tr.). The parties also do not dispute that Zavgorodny taught almost the identical composition of claim 3, a 3'-*O* azidomethyl blocked *nucleoside*, as opposed to a *nucleotide* in claim 3. JTX051; Tr. at 806–08, 1026–27.

Unlike every other Asserted Claim, except for claim 1 of the '025 Patent, claim 3 of the '444 Patent has no use requirement. *Id.* It is not limited to sequencing applications. In fact, the '444 Patent states that 3'-*O* blocked nucleotides are useful for "sequencing reactions, polynucleotide synthesis *and the like*." '444 Patent 8:47-53 (emphasis added). The '444 Patent also discusses use cases other than sequencing such as DNA synthesis. *Id.* at 8:11-13. Further, Metzker's 1994 paper on 3'-*O* blocked nucleotides, which the '444 Patent cites, explains the other applications that are common to sequencing, e.g., synthesis, mechanistic studies, and antivirals. TX-3258.1 (explaining that 3'-*O* modified nucleotides "are useful as DNA sequencing tools,

mechanistic probes, antimetabolites, and as viral agents."). And contrary to Illumina's contention, a POSITA is not limited to expertise in sequencing but can have "experience in the research and development of DNA sequencing technology, including synthesis and use of labeled nucleotides." *See* Final Jury Instructions at 22.

In other words, Metzker's paper and the definitions of POSITA presented to the jury show that a POSITA working in sequencing would have known how to synthesize nucleotides and would know how 3'-*O* blocked nucleotides are used in related fields. This is because when a POSITA makes a 3'-*O* blocked nucleotide with respect to nucleotide synthesis, they start by making a 3'-*O* blocked *nucleoside* and then convert it into a nucleotide by adding a phosphate. Dkt. No. 541 at 790 (Metzker Trial Tr.); TX-3258.2-3. All of the various applications mentioned in his paper for 3'-*O* blocked nucleotides—sequencing, synthesis, mechanistic studies, and antiviral applications—share the same first step: evaluating how and whether polymerase will be able to incorporate the 3'-*O* blocked nucleotide into a growing strand. Dkt. No. 541 at 790–97, 823–24 (Metzker Trial Tr.). In fact, Romesberg confirmed that the way a polymerase acts upon 3'-*O* blocked nucleotides to incorporate it into a strand of DNA in both sequencing and antiviral applications is "essentially identical." Dkt. No. 542 at 1098–99 (Romesberg Trial Tr.).

Moreover, there is no dispute that Zavgorodny taught using the 3'-*O* azidomethyl blocked nucleoside as "a synthon," a molecule that one can build on to make other molecules. *See* JTX51.3. Metzker explained that the most common molecule a POSITA would make from the 3'-*O* azidomethyl blocked nucleoside synthon is the corresponding nucleotide. Dkt. No. 541 at 809–10, 827 (Metzker Trial Tr.); Tr. at 575–77 (R. Drmanac Trial Tr.). This is because nucleosides are not biologically active and polymerases, which are necessary for the aforementioned applications, are active only upon nucleotides. Dkt. No. 541 at 810–19, 816, 576 (Metzker Trial Tr.). Consequently, one reason for converting Zavgorodny's 3'-*O* azidomethyl blocked nucleoside to a nucleotide would be evaluating that nucleoside as a potential antiviral. In fact, Metzker testified that the most obvious reason to try Zavgorodny's 3'-*O* azidomethyl as an antiviral is because Zavgorodny said to. JTX7.1 ("Modification of the methylthiomethy (MTM) function in O-MTM derivatives of nucleosides enable synthesis of potential antivirals"); Dkt. No.

541 at 816–17 (Metzker Trial Tr.) (explaining that the O-MTM group is an intermediate that is used to make the 3 prime O-azidomethyl group and "so the derivative is the azidomethyl that can be used in – as a potential antiviral). And when it is tried, a 3'-*O* azidomethyl nucleotide is created, which invalidates the '444 Patent.

The jury was free to discount Romesberg's opposing testimony. For example, the jury could believe that Romesberg's testimony—that a nucleoside was only more similar to a nucleotide than a football was, Dkt. No. 542 at 1077—was not credible in light of the contradictory evidence: " the prior art and the patents discussing nucleotides and nucleosides together, the patents stating they were similar and that unless otherwise specified, everything discussed for nucleotides also applied to nucleosides, and the fact that another name for a nucleotide is a nucleoside mono-, di-, or triphosphate." Dkt. No. 596 at 7; Dkt. No. 541 at 810–15 (Metzker Trial Tr.); JTX12 ('025 Patent) at 2:53-57, 6:34-37; '444 Patent at 8:11-13, 8:47-50. The jury was also justified in not accepting Romesberg's testimony about how one would evaluate potential antiviral compounds because he has never performed any antiviral assays in his career. Therefore, Illumina's argument—that there was no evidence a jury could rely on to conclude that it would have been obvious for a POSITA to try Zavgorodny's 3'-*O* azidomethyl blocked nucleoside as an antiviral—fails.

Illumina's other contentions also fail. It argues that because Zavgorodny's 3'-*O* azidomethyl block on the nucleoside is reversible, no one would ever think it could be used as an antiviral, which requires the block not to be removed. Dkt. No. 621 at 16–17. But the fact that the azidomethyl is removable does not negate that it can be used in a non-reversible way. Hearing Tr. at 21. For example, the '444 Patent states that reversible terminators described in the patent are useful in Sanger sequencing, even though in Sanger sequencing, like antivirals, the block is not removed. '444 Patent at 16:33-63. Although Zavgorodny's azidomethyl block can be removed, it is reversible only when one adds the phosphines and other chemicals necessary to initiate the Staudinger reaction, and therefore, it can be used in a non-reversible way. Dkt. No. 541 at 828–29 (Metzker Trial Tr.). In addition, that no one ever tested Zavgorodny's 3'-*O* azidomethyl nucleoside as an antiviral does not mean it cannot be obvious. Such a fact would negate a finding

of anticipation but not a finding of obviousness where the underlying premise is that even if a particular invention had not been made it would have been obvious at the time of the invention. *See Graham v. John Deere Co. of Kansas City*, 383 U.S. 1, 13–14 (1966). Illumina also argues that "there are no antiviral drugs that have 3 prime blocked nucleosides," relying on Romesberg's testimony. Dkt. No. 621 at 18. But Metzker testified that AZT is such an example and Illumina's argument contradicts Zavgorodny's teaching to try it. Dkt. No. 597 at 9 (citing Dkt. No. 541 at 819–20 (Metzker Trial Tr.)); *see also* Dkt. No. 542 at 1100–01 (Romesberg Trial Tr.).

In light of this substantial evidence supporting the jury's verdict of obviousness, secondary considerations could not save claim 3 of the '444 Patent from an obviousness determination. *See infra* Part II.A.1.a; *see also Ohio Willow Wood Co. v. Alps S., LLC*, 735 F.3d 1333, 1344 (Fed. Cir. 2013) ("[W]here a claimed invention represents no more than the predictable use of prior art elements according to established functions, as here, evidence of secondary indicia are frequently deemed inadequate to establish non-obviousness."); *Geo. M. Martin Co. v. All. Mach. Sys. Int'l LLC*, 618 F.3d 1294, 1306 (Fed. Cir. 2010) ("Balancing all of the secondary considerations, this court agrees with the district court that, in light of the strong evidence of obviousness . . . [the] objective evidence of non-obviousness, even if fully credited by a jury, would fail to make a difference in this case.").

C. Claim 1 of the '025 Patent

Illumina asserts that Defendants have also failed to meet their burden of proving that Claim 1 of the '025 Patent is invalid as obvious because (1) Defendants' "only obviousness theory is contrary to the repeated legal conclusion by numerous judges that it would not have been obvious to use Zavgorodny's azidomethyl for sequencing-by-synthesis ("SBS")" and Defendants "ignored the overwhelming objective indicia of non-obviousness confirming the validity of the patents"; and (2) Defendants "failed to demonstrate by clear and convincing evidence that 'base linked to a detectable label via a cleavable linker' limitation is present in the prior art or would have been obvious to combine with all of the other claim requirements." Dkt. No. 579 at 2.

The '025 Patent is titled "Labelled Nucleotides." Dkt. No. 1-3 ("'025 Patent"). Claim 1 of the '025 Patent recites,

> "A nucleotide or nucleoside molecule having a ribose or deoxyribose sugar moiety and a base linked to a detectable label via a cleavable linker, wherein the sugar moiety comprises a protecting group attached via a 3' oxygen atom, and wherein said protecting group comprises an azido group that can be modified or removed to expose a 3' OH group."

Id. at 21:19-24. As with the '444 Patent, the jury determined that claim 1 of the '025 Patent is broader than any claim in the '200 or '537 Patents and therefore more susceptible to an invalidity challenge. Dkt. No. 597 at 19. Claim 1 expressly identifies the claimed molecule as being either a nucleotide or nucleoside with an azido block, which is broader than claiming a molecule with an azidomethyl block. *Id.* at 19 n.11. It also does not have a use requirement, unlike the '537 and '200 Patents. *Id.* at 20.

Defendants assert that the "jury was presented with substantial evidence showing that prior SBS references identified using azido (N_3) as a blocking group on a nucleotide" and that it was "well known in the field to have a cleavable linker attaching a fluorescent molecule to such bases." Dkt. No. 597 at 20. For example, the jury heard evidence about the Tsien reference, which suggested using an azido group in SBS sequencing.[2] Dkt. No. 538 at 192 (referring to JTX 9.023:15). Metzker testified that at least four references, the Dower, Tsien, Ju, and Parce references, taught that it was common knowledge to attach a detectable label to the base of a blocked nucleotide for use in SBS. Dkt. No. 541 at 862–63 (Metzker Trial Tr.). Even Romesberg testified that the use of such cleavable linkers was conventional before Illumina filed its patents. Dkt. No. 542 at 103.

That said, Defendants fail to provide clear and convincing evidence that a POSITA would have been motivated to combine the nucleotide or nucleoside molecule with a detectable label attached to the base by a cleavable linker. Dkt. No. 610 at 14. The only motivation theory that Defendants presented at trial is that a POSITA would have been motivated to combine these elements for the purposes of sequencing. *See* Dkt. No. 541 at 862 (Metzker Trial Tr.) ("[A]

[2] Although I declined to admit the Tsien reference itself into evidence before closing arguments, I acknowledged that the reference was "part of the record from just the way that it was described on the stand" and therefore it was unnecessary and too late to put the reference itself into evidence after the close of the Defendants' case. Dkt. No. 543 at 1167.

cleavable linker and a label . . . was one of the standard methods that were used in the SBS method."). But the jury rejected this theory by finding the other claims in the '025 Patent valid.[3] *See infra* Part II.A.1.a; Part II.A.2. Defendants did not provide any other theory in the scant time it addressed the '025 Patent during the trial. Furthermore, as explained below, the secondary considerations support a finding of non-obviousness.[4] *See infra* Part II.A.1.a.

As a result, Illumina's JMOL motion on the '025 Patent is GRANTED. Its motion for JMOL and a new trial on the '444 Patent, however, are DENIED.

II. DEFENDANTS' MOTIONS FOR JUDGMENT AS A MATTER OF LAW AND NEW TRIAL

Defendants also renew their JMOL motion and assert that there is no substantial evidence to support the jury's verdict finding validity of the '973, '537, and '200 Patents, validity of all claims but claim 1 of the '025 Patent, indirect infringement of some of the patents, willful infringement, and damages in the amount of $8 million. Dkt. No. 580 at 1. For the reasons below, there is substantial evidence that is not contrary to the clear weight of the evidence to support the jury's findings on all of these issues.

A. Invalidity of the '973, '537, '200, and '025 Patents

1. '973 Patent

a. Obviousness

The Defendants' main argument is that substantial evidence does not support the non-obviousness of claim 13 of the '973 Patent. Dkt. No. 580 at 1–10. The '973 Patent is titled "Modified Nucleotides." 1465 Dkt. No. 1-1 ("'973 Patent"). Claim 1 of the '973 patent recites, "A method for determining the sequence of a target single-stranded polynucleotide, comprising

[3] Defendants did not single out Claim 1 of the '025 Patent in its obviousness theory or offer any basis for the jury to treat that claim differently than the '537 Patent. Dkt. No. 579 at 6. Instead, Metzker testified generally that "all three of these patents -- the '200, the '025, and the '537 -- are invalid in view of Parce, Zavgorodny, Kovacs, and/or Dower." Dkt. No. 541 at 862 (Metzker Trial Tr.).

[4] Defendants contend that there is no evidence of secondary indicia of non-obviousness that has a nexus to the "claimed standalone molecule" because Illumina's evidence is "directed to Illumina's sequencing platform as a whole." Dkt. No. 597 at 25. But it is the claimed feature "that is responsible for solving a long-felt need and improving SBS where others had failed." Dkt. No. 610 at 10.

monitoring the sequential incorporation of complementary nucleotides wherein at least one incorporation is of a nucleotide having a removable 3'–OH blocking group covalently attached thereto, such that the 3' carbon atom has attached a group of the structure –O—Z." *Id.* at 86:24-32. Claim 13 of the '973 patent states, "The method of claim 1 wherein Z is an azidomethyl group." *Id.* at 88:37-38.

In cases where "the question is whether a patent claiming the combination of elements of prior art is obvious," "it can be important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does." *Intel Corp. v. Qualcomm Inc.*, 21 F.4th 784, 794 (Fed. Cir. 2021) (quoting *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 417–18 (2007)). This is a factual inquiry. *Id.* The Supreme Court recognized that "[w]hen there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, a person of ordinary skill has good reason to pursue the known options within his or her technical grasp." *KSR*, 550 U.S. at 421. "In such circumstances, 'the fact that a combination was obvious to try might show that it was obvious under § 103.'" *Takeda Chem. Indus., Ltd. v. Alphapharm Pty., Ltd.*, 492 F.3d 1350, 1359 (Fed. Cir. 2007) (quoting *KSR*, 550 U.S. at 421).

Defendants assert that it would have been obvious to try to use Zavgorodny's azidomethyl nucleoside in an SBS method in light of the teachings in the Parce, Zavgorodny, and Kovacs references. Dkt. No. 596 at 2–3; Dkt. No. 613 at 1. They contend that using the *3'-O* azidomethyl as a blocking group on a nucleotide was obvious because (1) POSITAs knew that small blocking groups were preferred in SBS as they were more likely to be incorporated by a DNA polymerase and azidomethyl is a smaller blocking group; (2) that polymerase incorporated a chemically similar molecule to azidomethyl, the antiviral AZT; and (3) a POSITA would know that testing a blocked nucleoside as a potential antiviral would involve converting it into a nucleotide and then seeing whether it would be incorporated by a polymerase under Kovacs. *Id.* at 4-6. The parties agree that the SBS process consists of "(1) incorporating a complementary *3'-O* blocked nucleotide into a growing primer strand, (2) detecting the nucleotide that had been incorporated, and (3) removing the blocked nucleotide and repeating the process." Dkt. No. 580 at 1–2.

In arguing obviousness, Defendants first point to Parce, which teaches this SBS method and identifies two preferred *3'-O* blocking groups, phosphates and carbamates. *See* JTX34 ("Parce" reference). Parce also teaches looking for other blocking groups in references like the Green textbook, an organic synthesis textbook. *Id.* Defendants then point to Romesberg's testimony that Zavgorodny is an organic synthesis reference that teaches a *3'-O* azidomethyl blocking group on a nucleoside, which they argue "is extremely similar to nucleotides used in SBS." Dkt. No. 580 at 4 (citing Dkt. No. 542 at 1031 (Romesberg Trial Tr.)). They rely on Kovacs, which teaches converting nucleosides into nucleotides to study incorporation by polymerase. TX3038 ("Kovacs" reference). As a result, Defendants argue that "[h]aving followed the teachings of Zavgorodny and Kovacs to test a *3'-O* azidomethyl blocked nucleoside as a potential antiviral, a POSA would have understood that it satisfied a common feature of *3'-O* blocked nucleotides used in sequencing and as antivirals: incorporation by a polymerase." Dkt. No. 580 at 6. In Defendants' view, this would have motivated a POSITA to try Zavgorodny's *3'-O* azidomethyl blocked nucleotide in Parce's SBS method. *Id.*

Further, Defendants assert that Parce's teaching—that it is beneficial to simultaneously remove the blocking group and label attached with a cleavable linker—also directs a POSITA to use Zavgorodny's *3'-O* azidomethyl group in Parce's SBS method. *Id.* Zavgorodny teaches the well-known Staudinger reaction to remove the 3'-*O* azidomethyl block from the nucleoside. *Id.* at 7 (citing JTX7-5). Parce teaches that TCEP is a suitable phosphine to use in SBS sequencing to cleave the linker and remove the blocking group. *See* Dkt. No. 540 at 592–94 (Drmanac Trial Tr.). Illumina's inventors testified that a POSITA knew how to select different phosphines in the Staudinger reaction depending on the particular application and would normally start with the phosphine TPP. *See, e.g.*, Dkt. No. 571-17 (Milton Depo.) at 22, 24, 26, 46–47. In addition, by 2002, a POSITA knew that they should work in aqueous conditions with aqueous reagents when sequencing. And the phosphine that Parce identifies, TCEP, is aqueous and would be straightforward to use as the phosphine in the Staudinger reaction Zavgorodny describes to remove the 3'-*O* azidomethyl block. *Id.* at 7. Therefore, according to Defendants, "Parce's use of TCEP steers a POSA to Zavgorodny's *3'-O* azidomethyl blocking group" in Parce's SBS method.

Id. at 6.

In addition, because the jury found that claim 3 of the '444 Patent is obvious, *i.e.*, that a 3'-*O* blocked nucleotide is obvious, Defendants contend that claim 13 of the '973 Patent is also obvious as it simply claims using that nucleotide for one of its most common applications, sequencing. *Id.* at 7.

Contrary to Defendants' arguments, there is substantial evidence in the record to support the jury's rejection of Defendants' motivation to combine theory. Dkt. No. 596 at 2. First, Romesberg explained that a POSITA would not have had a motivation to use azidomethyl for SBS in 2002. Dkt. No. 542 at 1025–56. He testified that a POSITA would not have been interested in Zavgorodny for SBS because "there is no DNA in Zavgorodny. There [are] no nucleotides. There's no DNA synthesis. There [are] no polymerases. These are nucleosides. They're not recognized by polymerases, and there – and there's nothing in this paper that could have informed, that could have helped a POSA answer any of the questions he was trying to ask." *Id.* at 1028–32. Unlike with the '444 Patent where Zavgorodny expressly suggested antiviral applications, Metzker agreed that "Zavgorodny does not describe sequencing by synthesis." Dkt. No. 541 at 902.

Romesberg also explained that the successful removal of the azidomethyl blocking group, a requirement of SBS, was inconsistent with Zavgorodny because the removal conditions in Zavgorodny contained pyridine and were not "compatible with DNA" and "would have destroyed the primer template." Dkt. No. 542 at 1031 (Romesberg Trial Tr.). Although Metzker testified that the removal conditions in Zavgorodny were "very specific and very mild," Romesberg explained that the removal conditions were "mild in Zavgorodny's synthetic organic chemistry space" but "not mild at all for DNA synthesis." Dkt. No. 541 at 828–29 (Metzker Trial Tr.); Dkt. No. 542 at 1030–31 (Romesberg Trial Tr.). As a result, Illumina asserts that a "POSITA would not have been motivated to try just any blocking group similar to AZT" because Romesberg testified that there are examples where "the addition of a single atom completely destroys the recognition" by the polymerase. Dkt. No. 542 at 1036–39 (Romesberg Trial Tr.).

Further, Romesberg testified that Parce would not have motivated a POSITA to modify

Zavgorodny's "very specific" removal conditions by using TCEP because Parce "did not use TCEP to deblock." Dkt. No. 542 at 1045–46 (Romesberg Trial Tr.). According to Romesberg, TCEP was used primarily for the cleavage of disulfide bonds, as in Parce, and not the Staudinger reaction. *Id.* at 1046–47. He also explained that a POSITA would not be motivated to use an azidomethyl blocking group because prior art taught that its removal resulted in at best a 60–80% yield and any SBS method, such as Parce, required an efficiency higher than 95% of extension to develop a method capable of sufficient read lengths. Dkt. No. 542 at 1043–44, 1050–52 (Romesberg Trial Tr.); Dkt. No. 541 at 894 (Metzker Trial Tr.) (Metzker agreeing that one of the "stringent requirements" or "formidable obstacles for the design and synthesis" of nucleotides with blocking groups for SBS was they needed to be "deprotected efficiently under mild conditions.").

Importantly, "this would only be relevant had a POSITA identified azidomethyl as a potential SBS blocking group. But none of the dozens of researchers attempting to make SBS work had even attempted that before Illumina's invention." Dkt. No. 596 at 4. According to Romesberg, "Parce's citation to the Greene textbook would have demotivated a POSITA to use azidomethyl because that blocking group was not even disclosed in the edition that Parce cites to" and the "correct chapter has a long list of alternatives that steer away from azidomethyl." Dkt. No. 542 at 1047–50. Moreover, Romesberg testified and Metzker agreed that the preferred blocking groups in Parce were "rather large ones," which contradicts Defendants' argument that a POSITA would have been motivated to try azidomethyl because of its small size. Dkt. No. 596 at 4–5 (citing Dkt. No. 542 at 1043 (Romesberg Trial Tr.); Dkt. No. 541 at 903–04 (Metzker Trial Tr.)). Given that there was not "a finite number of identified, predictable solutions," *KSR*, 550 U.S. at 421, Defendants' assertion that the '973 combination was obvious to try fails.

Although the prior legal proceedings only concerned the '537 Patent, Romesberg testified that "the reasoning of these ten judges appl[ies] to all of the asserted patents in this case." Dkt. No. 542 at 1021. Multiple prior proceedings dealt with the Greene textbook, and all concluded that it "would not have been obvious to use the azidomethyl group of Zavgorodny" for the purposes of SBS. Dkt. No. 542 at 1047–50 (Romesberg Trial Tr.); TX0413-014-015 (Federal

Circuit finding Greene supported a conclusion that a POSITA "would not have been motivated to use the azidomethyl group of Zavgorodny" in an SBS method); TX1783-008-012 (Judge Alsup rejecting Dr. Metzker's obviousness theory involving Greene and Wuts in granting Illumina's preliminary injunction against Qiagen); *see also* TX0986, TX0987, TX1803 (PTAB rejecting IPR petitions involving or citing Greene). Notwithstanding the jury's finding that a 3'-*O* blocked nucleotide is obvious in the '444 Patent, there is substantial evidence to support its finding that the use of this nucleotide for the purposes of SBS is not obvious.

Moreover, there are robust objective indicia of non-obviousness as substantial evidence to support the jury's verdict. Dkt. No. 596 at 7. For example, the evidence showed the "increasing demands in the community for better sequencing systems" starting "in the early 1990s." Dkt. No. 541 at 888. "This long-felt need was not met until a decade later, by Illumina's patented azidomethyl blocking group." Dkt. No. 579 at 9. Metzker also testified to the failure of others in the industry to identify the azidomethyl blocking group. He admitted that there was no one else "working with the azidomethyl as a protecting group between the time Zavgorodny was published [1991] until the Bentley paper" in 2008—almost two decades. Dkt. No. 541 at 902, 904 (Metzker Trial Tr.). There was also evidence of skepticism that the azidomethyl blocking group would work with SBS in 2008–2009, which weighs in favor of proving that the invention was far from obvious. *See* Dkt. No. 540 at 737 (S. Dramanac Trial Tr.) ("Q. . . broadly in the community there was skepticism about sequencing by synthesis at the time? A. Yes. Some people would talk about that, yes.").

In addition, evidence of unexpected results—e.g., reducing the cost of sequencing from more than a hundred thousand dollars in 2012 to less than $600, industry praise, and commercial success—all signify that the claimed invention was not obvious. *See, e.g.*, Dkt. No. 525-4 (D. Smith Depo.) at 97 ("I am a huge fan of the Illumina sequencing platform, and I applaud them for their remarkable success and the fact that they drove the $1 million cost to substantially below $1,000 -- well, two -- less than $1,000, all because of Illumina, yes."), *id.* at 99, 112–13 (Illumina's sequencing platform "currently is the best sequencing platform on the planet because it meets all the criteria of the quality of the data and the robustness of the machines."); Dkt. No. 538

at 236 (Tousi Trial Tr.) (testifying that Illumina has been recognized as the world's smartest company, one of the most innovative companies, and recently, one of the most influential companies by Time Magazine). Metzker did not present any opinion on the objective indicia. Dkt. No. 541 at 879–86; Dkt. No. 525-12 at 52–53. Given this, the jury was entitled to rely on the substantial showing Illumina put forward supporting non-obviousness.

Finally, Defendants contend that Illumina admitted that the selection of azidomethyl was obvious. Dkt. No. 580 at 2–3. They argue that if "Illumina's amorphous 2002 disclosure of an azidomethyl group satisfies the written description and enablement requirements for azidomethyl when Illumina included it in the '537 claims five years later, then it must be because it was already known to a POSA to try azidomethyl in 2002 and how to remove it." Dkt. No. 613 at 6. The '537 Patent initially mentioned only "carbonyl" as a blocking group for SBS and did not disclose azidomethyl. *See* JTX83 ('537 Patent). It only stated that POSITAs already knew how to select blocking groups for SBS. *See id.* at 7:65-67 ("Suitable protecting groups will be apparent to the skilled person, and can be formed from any suitable protecting group disclosed in Green and Wuts, supra."). Although Figure 3 of the '537 Patent listed twenty formulas as examples of protecting groups, Metzker testified that these formulas could represent "millions" possible blocking groups. Dkt. No. 541 at 847 (Metzker Trial Tr.). Defendants therefore contend that because azidomethyl was never initially named in the '537 Patent, this suggests that a POSITA in 2002 already knew how to select and remove azidomethyl from the "millions identified in Fig. 3," thereby making the azidomethyl invention obvious. Dkt. No. 580 at 3; Dkt. No. 613 at 6.

But Illumina points out that the jury heard Defendants' evidence and presumably rejected their contention by finding that claim 13 of the '973 Patent is not invalid. Dkt. No. 596 at 9–10. The jury heard evidence from Romesberg that the '537 patent describes and enables the use of the azidomethyl invention for SBS. *See* Dkt. No. 542 at 1063–64. Defendants assert that Romesberg's claim "that azidomethyl would come to a chemist's mind even though the '537 patent has 20 generic formulas that identify millions of blocking groups" is conclusory and cannot sustain the jury's verdict. Dkt. No. 613 at 6 n.5. But Romesberg supports his conclusion with sufficient reasoning. He points to one formula in Figure 3 of the '537 Patent, that has N_3 and R_4

and R_5. *Id.* at 1063. He explains "that certainly could be other things; but what they list R_4 and R_5 as is they say it's equal to hydrogen or an alkyl group. So the only one they expressly name is hydrogen; and when it's hydrogen, that's the azido group. And it's also the parent compound." *Id.*; *see* '537 Patent, Fig. 3. As a result, the azido group is "the one that would come to a chemist's mind when you draw this structure." *Id.* at 1063. Romesberg also explained that Metzker was "counting non-azido molecules" when he stated that there were millions of possible molecules based on the structures in Figure 3. *Id.* at 1063–64. Because the '537 Patent claims do not cover non-azido molecules, the other combinations are irrelevant to enablement and written description. *Id.* at 1064. As a result, there is substantial evidence for the jury to find that the '537 Patent satisfies the enablement and written description requirements and therefore there is no inconsistency with their finding that the claim 13 of the '937 Patent is non-obvious.

Accordingly, obviousness of the '973 claim is not the only reasonable conclusion the jury could reach given the evidence. Defendants' motion for JMOL on the non-obviousness of the '973 Patent is DENIED.

b. Written Description Requirement

The parties also dispute whether claim 13 of the '973 Patent is invalid for failure to satisfy the written description requirement. The test for written description is whether the specification would have objectively demonstrated to a POSITA that the patent applicant actually invented or "possessed" the claimed subject matter when the patent application was filed. *See Alcon Research Ltd. v. Barr Labs., Inc.*, 745 F.3d 1180, 1190 (Fed. Cir. 2014). "To fulfill the written description requirement, a patent owner must convey with reasonable clarity to those skilled in the art that, as of the filing date sought, he or she was in possession of the invention, and demonstrate that by disclosure in the specification of the patent." *Idenix Pharms. LLC v. Gilead Scis. Inc.*, 941 F.3d 1149, 1163 (Fed. Cir. 2019) (internal quotation marks omitted). That test "requires an objective inquiry into the four corners of the specification from the perspective of a person of ordinary skill in the art." *Ariad Pharms., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1351 (Fed. Cir. 2010).

Defendants assert that because claim 13 covers the use of incorporated unlabeled nucleotides and the specification fails to convey to a POSITA that inventors possessed such an

invention, the claims are invalid. Dkt. No. 580 at 10. This argument fails because the "invention of Claim 13 is based on the use of the reversible azidomethyl blocking group for SBS" and not the "specific nature of the detection scheme whether it be labels or otherwise." *See* Dkt. No. 596 at 12. Indeed, Defendants repeatedly characterize the invention of the '973 Patent as "azidomethyl on the 3 prime of a nucleotide in [] sequencing." *See, e.g.*, Dkt. No. 538 at 208; Dkt. No. 525-12 at 56–57 (Metzker Depo.) (agreeing that the Asserted Patents were "focused specifically on the azido blocking group.").

Defendants assert that the claimed invention includes the use of unlabeled nucleotides because the "only difference between '973 claim 13 and the claims of the '200 and the '537 patents is the fact that '973 claim 13 does not require a label while other claims do." Dkt. No. 613 at 8. But the testimony on which Defendants rely does not support their argument that the claimed invention is the use of unlabeled nucleotides. *See* Dkt. No. 541 at 861 (Metzker Trial Tr.) ("Q. What does this show as to how that group of three [the '025, '537, and '200 Patent] differs from the '973 and the '444? A. Well, now, this is the narrowest claim set for these three patents, and they have the additional requirement now of being labeled 3 prime blocked nucleotides."); Dkt. No. 542 at 1075 (Romesberg Trial Tr.) ("Q. Right. And the '537, the '200, and the '025, those are the ones that not only do they require azidomethyl, they also require a cleavable linker with a fluorescent molecule attached that can be incorporated in an extension reaction; right? A. Yes"). Moreover, Defendants incorrectly argue that the "full scope of the claims, including the purported absence of a label, must satisfy the written description requirement"; this is the legal standard for enablement, not the written description requirement.[5] Dkt. No. 613 at 8; *MagSil Corp. v. Hitachi Glob. Storage Techs., Inc.*, 687 F.3d 1377, 1380 (Fed. Cir. 2012) ("To be enabling, the specification of a patent must teach those skilled in the art how to make and use the full scope of the claimed invention without 'undue experimentation.'").

Defendants do not contend that Illumina did not possess the invention—i.e., the use of the

[5] Defendants do not dispute the jury's finding that the '973 Patent fully enables a POSITA to practice the full scope of the claimed invention—e.g., the use of the reversible azidomethyl blocking group for SBS using unlabeled nucleotides. *See* Dkt. No. 550 ("Jury Verdict" ¶ 14; *see also* 1465 Dkt. No. 465.

reversible azidomethyl blocking group for SBS—at the time the '973 Patent was filed. Their invalidity argument based on lack of written description fails. Defendants' JMOL motion regarding the '973 Patent is DENIED.

c. Motion for New Trial

Defendants move for a new trial on the basis that Illumina mischaracterized the prior proceedings—the dispute between Illumina and Qiagen and the IPR petitions—as involving more than the '537 Patent to give the impression that all asserted patents had been held not invalid. Dkt. No. 581 at 4–6. Defendants' motion fails for a number of reasons. The prior decisions were all shown to the jury and moved into evidence; there is no reason to believe that the jury misunderstood which patents were involved in the prior proceedings. Illumina repeatedly characterized the prior proceedings as involving only the '537 Patent. *See, e.g.*, Dkt. No. 538 at 179, 182 (stating that the Qiagen IPR "relates to the '537 Patent" in Illumina's opening statement); Dkt. No. 540 at 617–18 (R. Drmanac Trial Tr.) (emphasizing that Defendants could have challenged the other patents-in-suit if they thought they were invalid, but Defendants only chose to challenge the '537 Patent in their IPRs). Defendants also repeatedly emphasized that the prior IPR decisions were limited to the '537 Patent. Dkt. No. 543 at 1260, 1275; Dkt. No. 540 at 594 (R. Dramanac Trial Tr.) (explaining that only one of the five asserted patents were challenged in the IPRs); Dkt. No. 541 at 808–09 (Metzker Trial Tr.) (confirming that only the '537 Patent was subject to IPRs). It did not mischaracterize the prior decisions as involving patents other than the '537 Patent. Instead, it properly explained that the reasoning from the prior decisions regarding the prior art applied to the other patents. Dkt. No. 599 at 3; Dkt. No. 542 at 1020–23 (Romesberg Trial Tr.) (explaining why the reasoning from the prior decisions applies to the other patents). In sum, there was no jury confusion resulting in a miscarriage of justice that would warrant a new trial.

Defendants also assert that a new trial is warranted because during closing arguments "Illumina misleadingly presented Balasubramanian's testimony in a way that implied he thought of using unlabeled nucleotides at the time of the claimed invention." Dkt. No. 581 at 6. The excerpt of Balasubramanian's testimony is on a slide titled "Inventors Envisioned No Labels" and

the quote states,

> "So, I didn't myself envisage a scheme using unlabeled. But, you know, the team had a mixture of ideas, I know. Different labeling schemes. My original vision was to use four different labels, but of course there are methods that don't necessarily need four labels and could use combinations and even zero labeling. So, clearly there were people in the company who had more than one view on that."

Dkt. No. 597, PDX-8.22. Defendants point out that Illumina omitted the subsequent testimony where Balasubramanian testified that he did not remember when the "zero labeling" discussion occurred. *See* Dkt. No. 571-13 (Balasubramanian Depo.) at 312 ("Q. What scheme were you aware of at the time, from '98 to 2005, that used zero labels for the incorporated nucleotide and allowed you to monitor as the incorporation progressed? A. So I don't fully recollect when in time these ideas came in.").

Illumina's use of this demonstrative is not so prejudicial that it warrants a new trial. The slide was intended to counteract Defendants' closing statement: "So Dr. Balasubramanian, the one that the Queen knighted, [said] 'I didn't envision a scheme using unlabeled.'" Dkt. No. 543 at 1278. Illumina's counsel also concluded by highlighting the fact that the testimony was from inventors 20 years after the fact, and the proper analysis is to focus on the patent itself. Dkt. No. 543 at 1322. In addition, after I overruled Defendants' objection about the demonstrative, I instructed the jury that lawyer argument is not evidence and that the jury should look to the evidence. *Id.* at 1321–22. No new trial is warranted based on Illumina's use of the Balasubramanian demonstrative. Defendants' motion for a new trial based on these grounds is DENIED.

2. '537, '200, and '025 Patents

Defendants' assertion that the '537, '200, and '025 Patents are obvious also fail. Their only argument is that the asserted claims of these patents are obvious because they add "only one thing to what is claimed in the '973 patent: that there be a label attached to the base of the azidomethyl blocked nucleotide via a cleavable linker" and that this limitation "was already well-known." Dkt. No. 580 at 13. But because what is claimed in the '973 Patent is not obvious and because each asserted claim in these patents also require what is claimed in the '973 Patent,

Defendants' argument fails. Defendants' JMOL motion on these patents is DENIED.

B. Willfulness

1. JMOL

Defendants contend that they are entitled to JMOL of no willfulness because Illumina has failed to prove that Defendants had knowledge of each Asserted Patent or intent to infringe that patent.[6] Dkt. No. 580 at 14. "Willful infringement is a question of fact reviewed for substantial evidence following a jury trial." *Polara Eng'g Inc v. Campbell Co.*, 894 F.3d 1339, 1353 (Fed. Cir. 2018). "To establish willfulness, the patentee must show the accused infringer had a specific intent to infringe at the time of the challenged conduct." *Bayer Healthcare LLC v. Baxalta Inc.*, 989 F.3d 964, 987 (Fed. Cir. 2021). The answer to the question of intent "must be inferred from all the circumstances. Hence a party cannot be found to have 'willfully' infringed a patent of which the party had no knowledge." *Gustafson, Inc. v. Intersystems Indus. Prod., Inc.*, 897 F.2d 508, 510–11 (Fed. Cir. 1990). "A patentee needs to show by a preponderance of the evidence the facts that support a finding of willfulness." *Bayer*, 989 F.3d at 987.

The parties first dispute the appropriate legal standard for willfulness, specifically whether "knowledge of a patent" means "knowledge of each patent one-by-one," as Defendants contend. Courts have held that general knowledge of a patent portfolio is insufficient to support willfulness. *See, e.g.*, *Finjan, Inc. v. Cisco Sys. Inc.*, No. 17-CV-00072-BLF, 2017 WL 2462423, at *5 (N.D. Cal. June 7, 2017) (dismissing FAC for failure to state a claim where the FAC "never ties" the general knowledge of the patentee's patent portfolio to the asserted patents nor makes any factual allegations that the alleged infringer specifically learned of the asserted patents); *Longitude Licensing v. Apple Inc*, No. 14-CV-04275-EDL, 2015 WL 1143071, at *2 (N.D. Cal. Mar. 13, 2015) (dismissing FAC at the pleadings stage because an allegation that the alleged infringer had knowledge of the patentee's patent portfolio generally was insufficient to allege pre-lawsuit

[6] Illumina asserts that Defendants waived their willfulness JMOL arguments—that Illumina failed to differentiate between the parties, products, and patents for purposes of willfulness—by failing to raise them during trial. Dkt. No. 596 at 16. Contrary to its assertion that Defendants' "generic Rule 50(a) motion was insufficient," *id.*, Defendants followed my Rule 50 procedure and their Rule 50(a) motion identified Illumina's failure of proof on willfulness. *See* Dkt. No. 540 at 724.

knowledge of the specific patents-in-suit).

That said, "the Federal Circuit has cast significant doubt on that authority." *SiOnyx, LLC v. Hamamatsu Photonics K.K.*, 330 F. Supp. 3d 574, 609–10 (D. Mass. 2018). In *WCM Industries, Inc. v. IPS Corp.*, 721 F. App'x 959 (Fed. Cir. 2018), the "principal argument on appeal [was] that the district court erred in refusing to grant judgment as a matter of law of no willfulness because there [was] no evidence that [the infringer] had knowledge of the patents before the lawsuit began." *WCM Industries*, 721 F. App'x at 970. The defendant relied on *State Industries, Inc. v. A.O. Smith Corp.*, 751 F.2d 1226 (Fed. Cir. 1985), and *Gustafson, Inc. v. Intersystems Industrial Products, Inc.*, 897 F.2d 508 (Fed. Cir. 1990), for the proposition that "[t]o willfully infringe a patent, the patent must exist and one must have knowledge of it." *WCM*, 721 F. App'x at 970 (quoting *State Indus.*, 751 F.2d at 1236). The Federal Circuit explained that "*State Industries* does not establish a per se rule" and emphasized *Gustafson*'s holding that the infringer's intent "must be inferred *from all the circumstances*." *Id.* (emphasis in original). It examined the evidence, which included the fact that the accused infringer was aware of a patent lawsuit between the patentee and another company, the testimony from an employee of the accused infringer that "he had monitored [the patentee's] products for decades and possessed catalogs and other literature indicating that [the patentee's] products were marked with 'patent pending,'" and the fact that the accused infringer had a "culture of copying." *Id.* at 971. The Federal Circuit concluded that the patentee had "provided sufficient evidence for a reasonable jury to conclude that [the accused infringer] did know of [the patentee's] patents as they issued, if not earlier." *Id.* at 970.

Accordingly, knowledge of the specific patents is not required to support a finding of willful infringement. Instead, "the patentee must show the accused infringer had a specific intent to infringe at the time of the challenged conduct" based on the totality of the circumstances. *See Bayer*, 989 F.3d at 987; *WCM Industries*, 721 F. App'x at 970. In light of this standard, I will review Defendants contentions that the jury's finding of willful infringement is improper because (1) Illumina only showed knowledge of the '537 Patent; (2) there was no pre-suit willful infringement of the '537 Patent by StandardMPS; and (3) there was no post-suit willful

infringement by CoolMPS.

a. Pre-litigation willfulness

It is undisputed that Defendants were aware of and concerned about the '537 Patent based on the Qiagen proceedings beginning in 2015. Defendants' leadership testified that they were aware of Qiagen's failed attempts to challenge Illumina's azidomethyl patents in 2015 and the subsequent injunction against Qiagen's GeneReader product in 2016. Dkt. No. 539 at 319–20 (C. Xu Trial Tr.) (Senior Director for Research); *id*. at 357, 370–71 (Zhang Trial Tr.) (CEO of BGI Americas); Dkt. No. 525-6 at 7, 9 (X. Xu Trial Tr.) (executive director of BGI Group). Defendants' knowledge of the '537 Patent supports a finding of intent to infringe. *See WCM Industries*, 721 F. App'x at 970–71; *see also Kewazinga Corp. v. Microsoft Corporation*, 2021 WL 4066596, at *17 (S.D.N.Y. Sept. 1, 2021) (holding that "evidence of pre-suit knowledge of a patent can be circumstantial and a reasonable factfinder could infer that [accused infringer] was aware of the '234 patent based on its actual knowledge of patents in the same family, including the '226 and '325 patents").

Defendants' witnesses also testified that they knew of Illumina's azido patents. Dkt. No. 539 at 432 (Tan Trial Tr.) (testifying that he had reviewed Illumina's patents in the 2015–2017 timeframe but could not recall which ones); *id*. at 439 (confirming that BGI sequenced DNA for KOLs after he "had reviewed the Illumina azido patents"); 525-1 at 113 (Bao Depo.) (BGIA's general manager confirming that "DNBSeq platform cannot enter US market due to IP consideration" is "referring to Illumina's patents"); Dkt. No. 539 at 385 (Zhang Trial Tr.) (confirming the same). In fact, one of Defendants' witnesses testified that Illumina's 2008 Nature Paper concerning its azido technology "caught everybody's eye." Dkt. No. 540 at 735–36 (S. Dramanac Trial Tr.). There was also substantial evidence that Defendants recognized that the use of azidomethyl would create problems with Illumina's patents because third-parties warned Defendants against using azidomethyl. Dkt. No. 596 at 18; TX0703 (Qiagen "ruled out the possibility of using azido chemistry"), TX0765 (Thermofisher "didn't want to touch anything with azido chemistry); TX1462 ("if it is cPAS, we will have to use different RTs [(blocking groups)] rather than current ones to sell in the United States); TX0687 ("must come up with an alternative

to azido ASAP"); TX0326 ("new critical projects, e.g., non-azido block").

Further there was substantial evidence of Defendants "copying" Illumina despite its knowledge of Illumina's patents. Dkt. No. 576 at 5–6. The jury heard evidence about the team of Defendants' researchers developing sequencing-by-synthesis technology that was called the "XY team," where "XY" was Defendants' code name for Illumina. Dkt. No. 539 at 313–14 (C. Xu Trial Tr.). The research team hired a third-party to determine the structure of Illumina's nucleotides, which revealed the details of Illumina's azidomethyl chemistry. TX2539; Dkt. No. 539 at 311 (C. Xu Trial Tr.). Illumina also presented evidence that Defendants had analyzed and copied not only its blocking group but also its polymerase, its sequencing algorithm, and its linker used to attach a fluorescent label to the nucleotides. Dkt. No. 539 at 316, 319 (C. Xu Trial Tr.); TX0662; Dkt. No. 540 at 650 (Romesberg Trial Tr.) (explaining that BGI's linker is "atom by atom . . . identical" to the linker described in Illumina's Nature publication).

b. Post-litigation willfulness

Similarly, there was substantial evidence that Defendants participated in post-suit willful infringement. For example, Defendants were operating a KOL program in which it offered to sell infringing products and imported infringing reagents. *See, e.g.*, Dkt. No. 538 at 279 (Xu Trial Tr.) (testifying that reagent kits with azido-blocked nucleotides for use on the BGI sequencers in San Jose are imported from China); Dkt. No. 539 at 420, 425 (Zhang Trial Tr.) (testifying that he was "involved in discussions [with Stanford] in 2020" and other KOLs). Furthermore, Defendants moved forward with a commercial launch of its infringing CoolMPS product in the U.S. and only stopped when I issued a preliminary injunction in June 2020. *See, e.g.*, TX0698-002 (a 2016 email from Y. Zhang discussing how the Chairman of BGI's Board of Directors, Jian Wang, instructed the Americas team to move forward with the commercial launch of its products in the U.S. and to "not be afraid of battles").

Accordingly, reviewing the record in the light most favorable to Illumina, there is ample evidence supporting the jury's finding of willful infringement. Defendants' JMOL motion on willfulness is DENIED.

2. Motion for New Trial

Defendants also contend that a new trial is warranted because (1) the jury's finding that Defendants acted willfully is against the clear weight of the evidence; (2) Illumina invoked an improper legal standard, and sought to leave the jury with an inaccurate and prejudicial understanding of the law; (3) Illumina incorrectly argued to the jury that Defendants did not dispute infringement without explaining that Defendants did not dispute infringement only after my claim constructions; (4) as discussed above, Illumina repeatedly mischaracterized the facts regarding the prior proceedings involving only the '537 Patent; and (5) the jury's willfulness finding may have been based in part on the invalidated '444 Patent. Dkt. No. 581 at 7–8.

As discussed earlier, the jury's finding does not go against the clear weight of the evidence and Illumina did not invoke an improper legal standard. *See supra* Part II.B.1. At trial, infringement was undisputed and so there was no error when Illumina told the jury that Defendants did not dispute infringement. Illumina's characterization of the prior proceedings was not misleading or prejudicial. *See supra* Part II.A.1.c. That the jury might have found willfulness in part based on infringement of the invalidated '444 Patent is not a basis for a new trial, particularly where there is ample evidence under a proper legal theory in support of the willfulness verdict. *See i4i Ltd. P'ship v. Microsoft Corp.*, 598 F.3d 831, 849 (Fed. Cir. 2010) (internal citations omitted) (holding that a jury's willfulness verdict cannot be set aside "simply because the jury *might* have decided on a ground that was supported by insufficient evidence" but that it should be upheld "if there was sufficient evidence to support any of" the patentee's theories of willfulness). Defendants' motion for a new trial on willfulness is DENIED.

C. Indirect Infringement

The parties also dispute whether I should grant JMOL or a new trial on the jury's finding of indirect infringement. The jury found induced infringement of the '444, '973, '537, and '200 Patents and contributory infringement of the '444 and '973 Patents.

Under § 271(b), "[w]hoever actively induces infringement of a patent shall be liable as an infringer." 35 U.S.C. § 271(b). "Inducement requires a showing that the alleged inducer knew of the patent, knowingly induced the infringing acts, and possessed a specific intent to encourage

another's infringement of the patent." *Vita-Mix Corp. v. Basic Holding, Inc.*, 581 F.3d 1317, 1328 (Fed. Cir. 2009). And under § 271(c), "[w]hoever offers to sell or sells within the United States or imports into the United States a component of a patented machine, manufacture, combination or composition, or a material or apparatus for use in practicing a patented process, constituting a material part of the invention, knowing the same to be especially made or especially adapted for use in an infringement of such patent, and not a staple article or commodity of commerce suitable for substantial noninfringing use, shall be liable as a contributory infringer." 35 U.S.C. § 271(c). A claim of contributory infringement requires "that defendant knew that the combination for which its components were especially made was both patented and infringing and that defendant's components have no substantial non-infringing uses." *Cross Med. Prod., Inc. v. Medtronic Sofamor Danek, Inc.*, 424 F.3d 1293, 1312 (Fed. Cir. 2005) (internal quotation marks omitted).

A party cannot induce or contribute to its own infringement and directly infringing acts must be those of "another." *Aro Mfg. Co. v. Convertible Top Replacement Co.*, 377 U.S. 476, 500 (1964) ("It is true that a contributory infringer is a species of joint-tortfeasor, who is held liable because he has contributed with another to the causing of a single harm to the plaintiff."). As for method claims, such as those in the '973, '537, or '200 Patents, it would be legally improper for the jury to find indirect infringement where the direct infringement were offers to sell or sales of a product, unless the product actually performed the patented method during the relevant infringement period. *Cardiac Pacemakers, Inc. v. St. Jude Med., Inc.*, 576 F.3d 1348, 1359 (Fed. Cir. 2009) ("The law is unequivocal that the sale of equipment to perform a process is not a sale of the process. Therefore, [the patentee] can only receive infringement damages on those devices that actually performed the patented method during the relevant infringement period."). That said, it is well-established that a parent company can be liable for contributing to or inducing the infringement of its affiliates. *See, e.g.*, *Astornet Techs. Inc. v. BAE Sys., Inc.*, 802 F.3d 1271, 1279 (Fed. Cir. 2015) (finding district court erred by not considering whether parent company could be directly liable for its own wrongful acts of inducing indirect corporate subsidiary).

Although Defendants' argument is true—that a jury cannot find that Defendants *as a whole* are inducing or contributing to their own *collective* infringement or indirect infringement based on

the acts of a single, individual Defendant—the jury could find indirect infringement if there was substantial evidence or no evidence to the contrary that different Defendants induced and contributed to the infringement of another Defendant. Dkt. No. 614 at 10.

1. JMOL

Defendants assert that Illumina's "flawed 'one BGI'" theory, where it groups all patents and corporate entities together and does not specify any evidence tied to a specific patent or accused product, cannot establish the requisite knowledge or intent to establish indirect infringement. Dkt. No. 613 at 12. Defendants only challenge that Illumina did not meet its burden of proof on the issues of "knowledge and intent." Dkt. No. 580 at 19. As discussed above, however, Defendants had knowledge of the Patents-in-suit and intent to infringe those Patents. *See supra* Part II.B; *see also* TX-0696 (Illumina 2015 email to Y. Zhang at Complete Genomics and forwarded to X. Xu at Genomics stating that if Defendants' platform "uses SBS and given that the external design seems to mimic Illumina's HiSeq platforms, this is likely to create some serious challenges").

There is also substantial evidence that different Defendant entities induced and/or contributed to the direct infringement of *another* Defendant entity. For example, Romesberg testified that BGI Genomics asked CGI to perform infringing sequencing runs in the U.S. and that MGI Americas and CGI shared the costs of business development and marketing. Dkt. No. 585 at 655–56. Roy Tan, the General Manager of MGI Tech, also testified that he authorized the importation of sequencers from China to MGI Americas and/or CGI—sequencers that were used to conduct infringing R&D work in the U.S. Dkt. No. 539 at 433–34; Dkt. No. 525-10 at 22. Yongwei Zhang, the CEO of BGI Americas, testified that MGI Tech also sold sequencing reagent kits to the Defendant entities, CGI, MGI Americas, BGI Americas, and BGI Research, located in the San Jose facility. Dkt. No. 539 at 405, 409. BGI Americas also encouraged CGI to split the costs of advertising in the U.S. for MGI's DNB technology used in BGI's infringing sequencers. TX0700.

Furthermore, the jury was presented with evidence that Chairman Wang, who was responsible for the "strategic level of planning of the whole BGI," gave the directive to enter the

U.S. market, including performing infringing sequencing runs. Dkt. No. 525-6 (X. Xu Depo.) at 18. MGI Tech directed the work of its subsidiaries, such as Complete Genomics, and encouraged the subsidiaries' infringement by using CGI's R&D to improve the MGI sequencers sold worldwide. Dkt. No. 525-6 (X. Xu Depo.) at 12–13 ("Q: Does MGI Tech make – make the decisions for Complete Genomics now? A: Yes."); Dkt. No. 525-2 (A. Chaturvedi Depo.) at 203–05 ("Q: How much money has CGI and MGI spent on research and development for the current line of sequencers and sequencing reagents that MGI Tech is selling all over the world? . . . What if I limited it to just the research and development work that was done in the United States? A: My estimate of money spent within the U.S. is in excess of $500 million for the current line of sequencers.").

Defendants' corporate structure also shows that the five Defendants worked together in pursuit of a shared goal to enter the U.S. sequencing market and therefore their direct encouragement of each other, e.g., their shared resources, personnel, and expenses, constitutes substantial evidence that each Defendant had the *intent* to induce infringement by the others. TX0699-002 (starting in at least 2018, there was a push for the "America's team," MGIA, CGIA, and BGIA, to "work more proactively with other BGI divisions, such as MGI and BGI Genomics."); TX0699-014 (showing a plan to coordinate resources between the American entities, with support from MGI and BGI Genomics, to achieve a "ONE BGI model within the Americas Region!!!"). Accordingly, the jury's verdict on indirect infringement is substantially supported.

2. New Trial

Defendants assert that they are entitled to a new trial because the "jury's struggle with indirect infringement," as evidenced by its three questions during deliberations, "became a serious distraction, taking the jury away from the central issues of invalidity, willfulness, and damages for which the parties actually put in evidence." Dkt. No. 581 at 14. But the jury's verdict is not contrary to the evidence and does not warrant a new trial. There is no basis to conclude that the jury instructions and verdict form resulted in jury confusion. The final jury instructions properly instructed the jury that a finding of indirect infringement required an analysis of the indirect infringer's interactions with the direct infringer, thereby making clear that indirect infringement

required at least two parties. *See* Final Jury Instructions at 18.

Defendants also contend that the jury's questions during deliberations are evidence that the jury was confused by the indirect infringement issues and therefore distracted on the other pertinent issues, e.g., invalidity. Dkt. No. 614 at 11; *see* Dkt. No. 536 (Note 1 on Nov. 23, 2021) ("As it pertains to the issues of induced infringement and contributory infringement of "another", does "another" refer to entities outside of BGI Group, or entities outside as well?"); Dkt. No. 547 (Annotated Note 3 on Nov. 24, 2021) ("If a more specific patent (e.g. '537) uses components from another patent (i.e. '444), does a determination of induced/contributory infringement on the latter patent indicate induced/contributory infringement on the former? (i.e. by association)"); *id.* (Note 4 on Nov. 24, 2021) ("Can inducing infringement happen between individuals of the same entity (individuals being either peers or a reporting/management relationship)?"). Three questions during deliberations does not amount to jury confusion that warrants a new trial. There is no basis for a new trial on the issue of indirect infringement. Defendants' motions for JMOL and a new trial on indirect infringement is DENIED.

D. Damages

Defendants contend that substantial evidence does not support the jury's award of $8 million because Illumina's damages expert, Prowse (1) did not consider the alternative of performing the infringing R&D activities outside the U.S.; (2) did not account for the time-value of money; (3) improperly inflated the R&D expenditures; and (4) allocated all the benefits of doing research in the U.S. to Illumina. Dkt. No. 580 at 20. But Defendants do not "contend that reduction of damages (or a new trial) would be appropriate if the Court only finds that Illumina's theory does not account for the time value of money, is based on an inflated base of R&D expenditures or fails to split the benefits of the patents." Dkt. No. 613 at 15. They request a reduction to $295,000 only if I find Illumina's theory fails on all of the contended issues, and in particular Illumina's failure to account for the design around of doing experiments abroad.

The parties agreed that the appropriate license structure would be a lump sum payment for a license to perform research and development ("R&D") in the United States and that the hypothetical negotiation would have taken place in early 2014. The parties also agreed that the

Defendants' expected minimum rate of return on the R&D investment would be 17%. Prowse based his $25.4 million reasonable royalty estimate on Defendants' infringing R&D expenditures from early 2014 through June 2020. Dkt. No. 540 at 691–92 (Prowse Trial Tr.). But he did not account for any expenditures until 2016 because he could not identify any particular infringing R&D expenditures. *Id.* at 691. He calculated the value of Defendants' infringing R&D expenditures as $149.8 million and then multiplied the value with Defendants' expected rate of return, 17%, to conclude that the reasonable royalty is $25.4 million. *Id.* at 701–702. He acknowledged that factors in the *Georgia-Pacific* analysis would increase the reasonable royalty but decided not to increase the $25.4 million value and therefore concluded that his reasonable royalty estimate is conservative. *Id.* at 702–03.

In contrast, Defendants' damages expert, Kearl, used the World Intellectual Property Organization ("WIPO") Innovation Output Indices to calculate the annual incremental benefit to Defendants of conducting the accused R&D in the U.S. as opposed to China. Dkt. No. 542 at 967, 72–75 (Kearl Trial Tr.). He converted these amounts into 2014 present value dollars, considered the non-infringing alternatives, and applied a 50:50 bargaining split to arrive at a reasonable royalty of $295,000. *Id.* at 957–59, 75–75, 1003. Kearl demonstrated that even under Prowse's methodology, the reasonable royalty attributable to R&D in the U.S. could be no more than $6.3 million. *Id.* at 943–44, 953–54, 957–58.

That said, the jury awarded Illumina $8 million, less than one-third of the $25.4 million that Illumina sought, which suggests that the jury considered Defendants' complaints. Dkt. No. 596 at 22. "The jury was entitled to choose a damages award within the amounts advocated by the opposing parties." *See Spectralytics, Inc. v. Cordis Corp.*, 649 F. 3d 1336, 1347 (Fed. Cir. 2011). And as explained below, the jury's award is supported by substantial evidence.

First, Defendants argue that Prowse improperly failed to consider the available non-infringing alternatives of performing the accused R&D activities outside the U.S. Dkt. No. 580 at 20–21; *see Riles v. Shell Expl. & Prod. Co.*, 298 F.3d 1302, 1312 (Fed. Cir. 2002) (holding that "the market could not award [the infringer] a royalty for his method divorced of all relation to a potential non-infringing alternative method"). But Prowse considered non-infringing

alternatives and testified that $25.4 million in damages was appropriate because doing the accused R&D in China was "[n]ot a commercially reasonable, cost-effective alternative." Dkt. No. 541 at 709 (Prowse Trial Tr.).

Prowse did not offer his own opinion on whether or not the accused R&D activities could have been done in China because he is not a technical expert. Dkt. No. 585 at 709–10 (Prowse Trial Tr.). Instead, he relied on Romesberg's testimony that Defendants "made a choice to conduct research and development in the United States by buying CGI and by investing a lot of money in CGI" in part because the "talent pool is more robust, you can accelerate the time to market from your products from doing R&D in the United States, and that moving R&D [operations out of the U.S.] would be disruptive and costly and impact the KOL relationships." Dkt. No. 540 at 699 (Prowse Trial Tr.); *id.* at 654 (Romesberg Trial Tr.) (testifying that the United States has a "rich talent pool" and that relocating outside of the U.S. would involve loss of institutional knowledge). Romesberg, however, also testified that Defendants' sequencing experiments could "be run in another place like China" and "there would be no difference between doing that in the process with someone in China or anyplace." *Id.* at 661–63, 667 (Romesberg Trial Tr.). Prowse also relied on Drmanac's testimony that "excluding U.S. scientists from evaluating CoolMPS will slow down its development and could lead to a product which is not as robust as it might otherwise be" and that "[t]his will likely set back the development of our technology worldwide." *See* TX-1541-007. Defendants point out that Prowse admitted that this forward-looking statement was made in 2020, six years after the hypothetical negotiation. Dkt. No. 540 at 715–16 (Prowse Trial Tr.). They also assert that Prowse did not account for Defendants' ability to conduct R&D abroad. *See, e.g.*, Dkt. No. 539 at 413 (Zhang Trial Tr.) ("Q. Are [researchers in Shenzhen] capable of performing sequencing runs and sequencing experiments? A. Absolutely").

The jury was free to weigh Defendants' argument as it saw fit. It did just that, as evidenced by the $8 million award instead of Illumina's $25.4 million. Similarly, Prowse's failure to discount the return on 2016–2020 R&D expenditures to 2014 dollars does not mean that the jury's damages award is unsupported by substantial evidence. Dkt. No. 596 at 24. Both experts

opined that Defendants would have paid an "up-front" lump-sum to Illumina in 2014 and the "jury apparently weighed BGI's time value argument in awarding less than a third of what Illumina sought." *Id.* at 24.

Defendants also contend that no evidence supported Prowse's assumption that all R&D "related to the DNBseq technology" was infringing. Dkt. No. 613 at 14. Both parties relied on a spreadsheet of all Defendants' R&D expenditures between 2014 and 2020. *See* JTX082. Prowse included all line items that Defendants' Chief Financial Officer, Charturvedi, stated were "related to the DNBseq technology" because he understood that this technology "goes into [] the core platform of all of the accused products that BGI sells worldwide that use the azidomethyl blocking group." Dkt. No. 540 at 691 (Prowse Trial Tr.). Prowse admitted that he did not rely on any technical experts in forming his opinion on which research activities infringe Illumina's patents. *Id.* at 722. In contrast, Kearl testified that based on a conversation with Drmanac, the Chief Science Officer at CGI, the total expenditures for projects that touched on the infringing azidomethyl blocking technology was $108.4 million, not $149.8 million, as Prowse found. Dkt. No. 542 at 962, 964 (Kearl Trial Tr.). While Prowse may have inflated R&D expenditures, the jury was entitled to weigh the experts' testimony.

Finally, the damages award is also unsubstantiated in Defendants' view because Prowse improperly allocated all the benefits of research in the U.S. to Illumina and the benefits of non-infringing activities that are unrelated to the Asserted Patents to Defendants. Dkt. No. 540 at 702–03. As a result, Defendants contend that under Prowse's improper analysis, Defendants take nothing from the bargaining table. *Id.* Illumina responds that Prowse did not allocate all of the benefits of Defendants' infringement to Illumina. Dkt. No. 613 at 24–25. For example, Prowse started counting infringing R&D expenditures in 2016 instead of 2014, which the parties do not dispute is when Defendants began its infringing R&D activities in the U.S. Dkt. No. 540 at 689 (Prowse Trial Tr.) ("the infringing R&D at CGI began in early 2014"); *id.* at 711 ("Q. And your damages calculation does not include any amount spent on accused R&D in 2014 or 2015; correct? A. Correct. As I said in my direct, I know there was some expenditures, but I didn't

carve them out.").[7] Prowse also testified that Defendants would receive the benefit of performing R&D in China related to the Accused Products, although Defendants contend that Prowse did not opine that this benefit was separate from the 17% rate of expected return from the investment. Dkt. No. 540 at 702–03 (Prowse Trial Tr.); Dkt. No. 613 at 15. But again, the jury was free to weigh these arguments when awarding less than a third of the damages sought by Illumina.

In sum, the jury's damages award is supported by substantial evidence—Prowse's consideration that doing R&D in China is not commercially reasonable based on Romesberg's testimony, the infringing R&D expenditures according to the Chief Financial Officer versus the Chief Science Officer, and the proper allocation of benefits. Defendants' requests for JMOL on damages and remitter are DENIED. Moreover, it is not "grossly excessive or monstrous, clearly not supported by the evidence, [and] based only on speculation or guesswork" to warrant a new trial. *Wordtech Sys., Inc v. Integrated Networks Sols., Inc.*, 609 F.3d 1308, 1318–19 (Fed. Cir. 2010). Because I only find that Illumina's damages theory failed to account for the time value of money and may have been based on inflated R&D expenditures, a new trial on damages is not required. Dkt. No. 614 at 13. Defendants' motion for a new trial on damages is DENIED.

E. Defendants' Ties to China

There is no basis for a new trial due to Illumina's references to Jian Wang as "Chairman Wang." Defendants contend that a new trial is warranted because "Illumina repeatedly used inflammatory language about Defendants' ties to China, insinuating that Defendants are aligned with stereotypes of communism or Chinese companies and/or business practices." Dkt. No. 581 at 15. They argue that Illumina's references to Jian Wang as "Chairman" Wang "drew an association between Dr. Wang (a Chinese national) and the well-historical Chairman of the Chinese Communist Party, Chairman Mao." *Id.* at 16. But Jian Wang is, in fact, the Chairman of the Board of Directors at BGI. *See, e.g.*, J. Wang Depo. at 16 ("Q: What is your role on that Board of Directors? A: I'm the chairman."); Zhang Depo. at 84 ("Q: And who is Wang Jian? A: Wang

[7] Prowse did not opine on Illumina's other argument and therefore it cannot support the jury's verdict—that Illumina's stronger bargaining strength justifies Prowse attributing all benefits of conducting experiments in the U.S. to Illumina. *See* Dkt. No. 596 at 25; Dkt. No. 613 at 15.

Jian is BGI cofounder and the chairman."). Illumina explains that it distinguished Jian Wang as Chairman because Defendants had other employees with the last name Wang. Dkt. No. 599 at 25. During trial, I agreed with Illumina that it was "hard to keep track of who is being referred to" and "given Dr. Wang's important role . . . referring to him as the chair is not inappropriate." *See* Dkt. No. 539 at 378. There is no basis for a new trial on these grounds.

Accordingly, Defendants' JMOL motion and motion for a new trial are DENIED.

III. PERMANENT INJUNCTION

Next, Illumina requests that I convert the preliminary injunction that was entered on June 13, 2020, into a permanent injuncting barring further infringement by Defendants until the expiration of the Asserted Patents. Dkt. No. 578 at 1. District courts "may grant injunctions in accordance with the principles of equity to prevent the violation of any right secured by patent, on such terms as the court deems reasonable." 35 U.S.C. § 283. "[N]ot surprising[ly], given the difficulty of protecting a right to exclude through monetary remedies that allow an infringer to use an invention against the patentee's wishes, historically courts have granted injunctive relief upon a finding of infringement in the vast majority of patent cases." *Apple Inc. v. Samsung Elecs. Co.*, 809 F.3d 633, 638–39 (Fed. Cir. 2015) (internal quotation marks omitted). As explained below, Illumina has demonstrated: "(1) that it has suffered an irreparable injury; (2) that remedies available at law, such as monetary damages, are inadequate to compensate for that injury; (3) that, considering the balance of hardships between the plaintiff and defendant, a remedy in equity is warranted; and (4) that the public interest would not be disserved by a permanent injunction." *eBay Inc. v. MercExchange, L.L.C.*, 547 U.S. 388, 391 (2006).

A. Irreparable Harm

"To satisfy the first *eBay factor*, the patentee must show that it is irreparably harmed by the infringement. This requires proof that a causal nexus relates the alleged harm to the alleged infringement." *Apple*, 809 F.3d at 639 (internal quotation marks and citations omitted). Illumina asserts that absent a permanent injunction it would suffer irreparable harm in the form of lost

sales, loss of market share, price erosion, and reputational harm, due to Defendants' infringement.[8] Dkt. No. 578 at 3–7.

First, Defendants' direct competition with Illumina favors permanent injunction because of the irreparable harm to Illumina in the form of lost sales and market share. *See Douglas Dynamics, LLC v. Buyers Prod. Co.*, 717 F.3d 1336, 1345 (Fed. Cir. 2013) ("Where two companies are in competition against one another, the patentee suffers the harm – often irreparable – of being forced to compete against products that incorporate and infringe its own patented inventions."). It is undisputed that the two parties are direct competitors and that their products both use the same patented azido chemistry. Defendants "position[] its imitative products as comparable to Illumina's sequencers in performance, while undercutting Illumina on price." Dkt. No. 578 at 4; s*ee* TX494-120; Dkt. No. 538 at 250 (Tousi Trial Tr.) ("The MGI products have followed . . . the same kind of low-, mid-, and high-throughput. And, you know, surprisingly, their specifications were almost identical to ours, including their high throughput T7 at 1 to 6 terra bases, which is exactly our NovaSeq at 1 to 6 terra bases."). Illumina asserts that Defendants specifically price their products to take market share away from Illumina. Dkt. No. 578-1 ("Tousi Decl.") ¶ 3; Dkt. No. 86 ("Van Oene Decl.") ¶ 47 ("MGI has marketed its DNBSEQ-G400 in this segment in direct competition with Illumina's sequencers, including for example, the NextSeq, HiSeq, and Novaseq."); *id.* ¶ 52 ("MGI's planned placement of sequencers with key opinion leaders is a first step toward gaining a foothold in the U.S. market so that it can eventually erode Illumina's market share.").

The loss of market share and lost sales would irreparably harm Illumina, particularly in light of the evidence of Defendants' intentional copying. *See, e.g.*, Dkt. No. 538 at 277 (Xu Trial Tr.) ("Q: And the Zebra Project used azido block nucleotides? A: Yes"); *id.* at 288 ("Q: My question was just, it was very simple: Did the Drmanacs know that you were using the Illumina

[8] As a preliminary matter, Illumina's reliance on my preliminary injunction ruling, Dkt. No. 185 alone does not satisfy Illumina's burden of proof. *See Ctr. for Biological Diversity v. Salazar*, 706 F.3d 1085, 1090 (9th Cir. 2013) (explaining that although "a court will generally refuse to reconsider an issue that has already been decided by the same court or a higher court in the same case . . . [i]n general . . . decisions at the preliminary injunction phase do not constitute the law of the case.").

sequencing reagents to develop the BGI sequencing chemistry? Did they know that or not? A: Yes, they did."); Dkt. No. 540 at 632 (Romesberg Trial Tr.) ("And BGI has not contested the infringement of the five patents, and it's my opinion that BGI, in addition, copied the invention."). As a result, Defendants' entry into the market would "undercut [Illumina's] pricing," "absolutely hurt [Illumina's] business," "really destroy [Illumina's] market," and "really destroy [Illumina's] business." Dkt. No. 538 at 251–53 (Tousi Trial Tr.).

Defendants' arguments in response are unpersuasive. Defendants' contention—that Illumina will not suffer irreparable harm because the next generation sequencing ("NGS") market is a multi-player market, Dkt. No. 601 at 1—does not negate Illumina's assertion of irreparable harm. As Illumina argues, the important question is "whether the head-to-head competition is based on the infringing use of Illumina's patented azido technology." Dkt. No. 612 at 2. Defendants do not deny that it directly competes with Illumina; that forces Illumina to compete against its own patented technology, which causes irreparable harm, for the reasons above. *Id.*; *Douglas Dynamics*, 717 F.3d at 1345. Defendants also contend that Illumina fails to show any evidence of lost market share. Dkt. No. 601 at 3. They emphasize how in China, where Defendants have the strongest market position, Illumina has been successful as evidenced by its penetration of the top 400 hospitals. *Id.*; Dkt. No. 538 at 251–53, 260–61 (Tousi Trial Tr.). They argue that there is "no reason to believe Illumina would be in a worse position in the United States, where [Defendants] will be a new entrant" and will be "nowhere near as strong a competitor as it is in China, where Illumina is expanding its market." Dkt. No. 601 at 3. Illumina's commercial success in China or any other market outside of the U.S., however, is irrelevant. *See Douglas Dynamics*, 717 F.3d at 1345 ("[T]his court again disagrees with the district court that [the patentee] should suffer some penalty for managing through great effort to maintain market share in the face of infringing competition.").

Second, Defendants' practice of providing no-cost exemplary products to influential key opinion leaders ("KOLs") in the industry damages Illumina by artificially driving down price. Dkt. No. 578 at 5. *See Celsis in Vitro, Inc. v. CellzDirect, Inc.*, 664 F.3d 922, 930 (Fed. Cir. 2012) (acknowledging that price erosion is a classic form of irreparable harm); Van Oene Decl., ¶¶ 23,

60, 67 ("Price is an important differentiator because MGI's products offer the technical benefits associated with Illumina's Solexa sequencing (e.g., high accuracy and high throughput) due to MGI's use of Illumina's patented technology. Thus, MGI's ability to undercut Illumina on price through infringement makes the risk of lost sales highly likely."). For example, current and prospective customers often use BGI's presence and cut-rate pricing to negotiate and attempt to extract price concessions from Illumina. *See* Van Oene Decl., ¶¶ 51, 66. And "once one customer receives a discount, then other customers will expect the same." Dkt. No. 578 at 5; Van Oene Decl. ¶ 51. Although Defendants contend that Illumina "offers no evidence to support its claims of price erosion," their KOL and litigation expert Smith admitted that if Defendants are permitted to launch in the U.S., they could drive down Illumina's prices in order to offer the best price. Dkt. No. 611-5 ("Smith Depo.") at 145–46, 65–66, 164–68.

Third, Illumina contends that it would suffer irreparable reputational harm, absent a permanent injunction. Dkt. No. 798 The nature of the sequencing market depends on relationships with KOLs who influence the purchasing decisions of other customers in the field. For example, Illumina has developed and maintains relationships with leading KOLs, such as Stanford, UCSF, and the Mayo Clinic. *See* Dkt. No. 538 at 247–49 (Tousi Trial Tr.). It also has a reputation as an innovator by the industry and its products are well-regarded. Dkt. No. 578-4 (depicting various examples recognizing Illumina's innovation); Smith Depo. at 113, 204 (commending Illumina's sequencing platform and characterizing Illumina's innovation as a "technological miracle"). "[I]f customers found the same 'innovations' appearing in competitors' [products], particularly products considered less prestigious and innovative," Defendants' infringing commercial use of Illumina's azido chemistry will damage Illumina's reputation as an innovator. *Douglas Dynamics*, 717 F.3d at 1344–45. "Exclusivity . . . is an intangible asset that is part of a company's reputation, and here, [the patentee's] exclusive right to make, use, and sell the patented inventions is under attack" by Defendants' infringement. *Id.* Defendants' only response—that Defendants' CoolMPS is superior to Illumina's products and therefore will not harm Illumina's reputation—is rejected for the reasons explained below. *See infra* Part III.D; *see also* Smith Depo. at 53 ("Q: Do you have confidence in the quality of the data for the BGI Cool

sequence? A: That would be a no.").

Fourth, Illumina's "unwillingness to license favor[s] finding irreparable injury." *Presidio Components, Inc. v. Am. Tech. Ceramics Corp.*, 702 F.3d 1351, 1363 (Fed. Cir. 2012). Illumina does not and has never licensed out its core sequencing technology. Dkt. No. 540 at 694 (Romesberg Trial Tr.) ("So I reviewed the deposition of an Illumina executive . . . who stated in his deposition that Illumina does very little out licensing and does not license out any of its core sequencing technology . . . SBS sequencing technology that the azido patents are part of."); Dkt. No. 542 at 986 (Kearl Trial Tr.) (BGI's expert noting that Illumina was "reluctant to license" its azido technology).

Finally, there is a causal nexus between Defendants' infringement and the irreparable harm to Illumina. Dkt. No. 578 at 7. "The purpose of the causal nexus requirement is to establish the link between the infringement and the harm, to ensure that there is 'some connection' between the harm alleged and the infringing acts." *Apple*, 809 F.3d at 640. Defendants contend that "the commercial success of [Illumina's] products cannot be tied to the patented features." Dkt. No. 601 at 6–7. But the evidence shows that the driving feature of sales of sequencers is the ability to accurately sequence DNA. *See* Dkt. No. 360-6 ("Romesberg Opening Rep.") ¶ 46 ("Illumina's . . . use of the azidomethyl blocking group is necessary to have a commercially feasible SBS product that uses reversible chain terminators"). Illumina's patented azido blocking group was a "technological miracle" that significantly drove down the cost of DNA sequencing. Smith Depo. at 203–04; Dkt. No. 538 at 234–36 (Tousi Trial Tr.) (describing how Illumina reduced the price of DNA sequencing from more than $100,000 in 2012 to less than $600).

Defendants' witnesses have also admitted that the azido chemistry is the key inventive feature in the Asserted Claims and Defendants' inability to find a commercially viable alternative for decades underscores the essentiality of the azido technology. *See* Dkt. No. 611-11 ("Sutherland Depo.") at 114, 239; Dkt. No. 539 at 326 (Xu Trial Tr.) (testifying that the azido blocking group was the "best chemistry"); Dkt. No. 540 at 741 (Fellis Trial Tr.) (agreeing that "Illumina's azido patent, [was the] best chemistry"). Even CGI's Chief Science Officer, Drmanac agreed "that the azido blocking group is a component of the success of the various successful

Illumina sequencing platforms." Dkt. No. 539 at 459 (Drmanac Trial Tr.). Illumina has therefore satisfied its burden of showing that "there is more than 'some connection' that the demand for sequencers is closely related to demand for the patented azido technology." Dkt. No. 612 at 6 (citing *Apple*, 890 F.3d at 640). Accordingly, Illumina has sufficiently shown that absent a permanent injunction, it will suffer irreparable harm.

B. Adequacy of Monetary Damages

"The second *eBay* factor is whether remedies available at law, such as monetary damages, are inadequate to compensate for the irreparable harm suffered by the patentee." *Apple*, 809 F.3d at 644–45. In this case, damages will not compensate Illumina for the loss of market share due to Defendants' infringement. *Douglas Dynamics*, 717 F.3d at 1345 ("[M]ere damages will not compensate for a competitor's increasing share of the market, a market which [Plaintiff] competes in, and a market that [Plaintiff] has in part created with its investment in patented technology."). Damages are also inadequate when the defendant's infringement "significantly changes the relevant market," as is the case here because Illumina has the reputation for being the exclusive source of sequencers that use the azido-blocking group. *See* Dkt. No. 542 at 986 (Kearl Trial Tr.) ("Q: And you understood that Illumina has a reputation as being the exclusive source of sequencers that use its patented sequencing technology? A: That, I don't know. It -- certainly inside the United States . . .").

The irreparable harm from Defendants' planned engagement with KOLs also cannot be compensated by monetary means. Defendants' contacts with and offer of products to KOLs would "seed the market" with Defendants' products and "allow them to embed themselves with Illumina's customers, while taking KOL time and mindshare away from Illumina's products." Dkt. No. 578 at 9–10; Tousi Decl. ¶ 3; Van Oene Decl. ¶¶ 49, 67–68. Notably, Defendants' damages expert, Kearl ignored the impact of KOLs in his analysis and his declaration does not explain how the harms to Illumina's KOL relationships can be quantified. *See* Dkt. No. 542 at 995 ("Q: And you didn't do anything to try to quantify them [KOL relationships]; right? A: No.").

Defendants point to Kearl's declaration that states, "there is no reason that a going-forward

reasonable royalty could not be determined with reasonable precision." Dkt. No. 601-7 ("Kearl Decl.") ¶¶ 14–17. But Kearl makes no attempt to actually estimate the lost sales due to Defendants' entry into any market where the parties compete, nor does he attempt to estimate a going-forward royalty. *See id.* ¶ 17.

Further, without an injunction Illumina would be forced to grant Defendants a compulsory license, which harms its right to exclude; Illumina has never licensed out its azido technology. *See* Dkt. No. 540 at 694 (Prowse Trial Tr.); Dkt. No. 542 at 984, 986 (Kearl Trial Tr.); *see also Douglas Dynamics*, 717 F.3d at 1345 (holding that the fact that plaintiff never licensed the infringed patents to maintain market exclusivity was an intangible asset that was part of the company's reputation). In sum, monetary damages are inadequate to compensate Illumina for the irreparable harm.

C. Balance of Hardships

"To satisfy the third *eBay* factor, the patentee must show that the balance of hardships weighs in its favor. This factor assesses the relative effect of granting or denying an injunction on the parties." *Apple*, 809 F.3d at 645 (internal citation and quotation marks omitted). Here, the balance of hardships favors a permanent injunction because of the minimal harm to Defendants, as evidenced by the availability of commercially viable non-infringing alternatives and Defendants' ability to move the infringing research and development abroad. Dkt. No. 578 at 11–15. In contrast, absent a permanent injunction, Illumina would suffer significant hardship as explained above. *See supra* Part III.A.

Defendants' witnesses admitted that Defendants have identified non-infringing alternatives, e.g., non-azido blocking groups that are allegedly "better than azidomethyl." *See* Dkt. No. 566-7 ("Xu Depo.") at 312–13. They also testified that Defendants' alternative chemistry should be commercially viable. *See, e.g.*, Dkt. No. 319-10 ("Tan Depo.") at 75, 87–89, 252–53 (admitting that the non-azidomethyl blocking group is being used with KOLs.); Dkt. No. 577-12 ("Mar. 25, 2021 J. Wang. Depo,") at 78–79, 87 (testifying that BGI was planning to launch a new product with "freedom to operate" in June 2021); Dkt. No. 577-14 ("June 2, 2021 Li Depo.") at 41–42 (noting that BGI would likely launch a new chemistry by August 2021, if not

sooner); Xu Depo. at 313 (Dr. Xu testified last August that BGI would make products with an alternative blocking group ready for launch by the end of 2021). They also testified that they "could easily move the infringing research and development abroad." Dkt. No. 578 at 12; Dkt. No. 540 at 733 (S. Dramanac Trial Tr.) ("Q. Now, for this type of work, this work that you were doing after the acquisition, how difficult would it be if your team were not on-site with you in San Jose but were somewhere else, for example, in -- with BGI in China? A. Well, not at all difficult because currently we are working with team in Shenzhen and the Zoom meetings and basically giving them instructions, analyzing their data. It's very easy."); Dkt. No. 542 at 950 (Kearl Trial Tr.) ("I talked with Dr. Drmanac about it and asked point-blank could this research be done in China, and he indicated yes.").

Defendants would not suffer harm if StandardMPS is permanently enjoined because Defendants have "no intention of selling" StandardMPS in the U.S. *See* Dkt. 67-3 at 1. And they would not suffer harm if CoolMPS is permanently enjoined because it is neither mature nor commercially viable. *See infra* Part III.D; *see* Dkt. No. 525-5 ("J. Wang Depo.") at 19 ("Q: Are you familiar with the presentation that Rade Drmanac gave where he introduced CoolMPS and stated it would be sold in the United States? A: I was aware of this technology of his, but at the time, it was not a mature one, so – and eventually, how he was talking about it, I do not know the details. And that technology even now is still not mature."). Further, Chairman Wang testified that CoolMPS is not essential to Defendants' business and that the U.S. market is not central to their success. *See* J. Wang Depo. at 83–84 ("Q: Do you consider the CoolMPS sequencers to be an important product line of BGI? A: No. Even after so many years, we have not seen it. In addition, without the -- these lines, we still live rather well. Therefore, it is not at a very important place for me."); *id.* at 61 ("Q: Did they report to you that the patent office rejection of BGI's challenge to the azido patents would be a hit to the U.S. business of BGI? A: As a matter of fact, at that time, that is in March of 2018. The U.S. government had already listed us in their 301 list. Therefore, at the time -- at that time, the U.S. business, to me, was no longer a very -- a most important business direction").

In the prior preliminary injunction proceedings, Defendants warned that a preliminary

injunction would result in the layoff of 54 local employees; this did not turn out to be true. *See* Dkt. No. 577-18 ("Zhao Depo.") at 223–24 (testifying that hundred percent of MGIA employees would be laid off due to a preliminary injunction); *but see* Dkt. No. 577-6 ("Liu Depo.") at 53–54 ("Q: Has the – has BGI laid anybody off as a result of the preliminary injunction that was entered in this case? A: I don't know how to answer your question. There is – as I mentioned to you, there is – you know, since the pandemic, it's – there is no company announcement in terms of laying people off"). While Dramanac testified that there were layoffs, his testimony concerned layoffs in January 2020 that were unrelated to Illumina and occurred five months before the preliminary injunction in June 2020. *See* Dkt. No. 611-17 (internal email discussing layoffs); Dkt. No. 611-7 ("Dramanac Depo.") at 582–83.

In contrast, denying a permanent injunction would require Illumina to compete against its own patented technology, which "places a substantial hardship" on Illumina. *Robert Bosch LLC v. Pylon Manufacturing, Corp*, 659 F.3d 1142, 1156 (Fed. Cir. 2011); *see supra* Part III.A. Defendants contend that because Illumina has had a dominant position in the U.S. NGS market for a decade and Defendants have yet to introduce it sequencers in the U.S. market, the balance of hardships favors Defendants as the smaller, new market entrant. Dkt. No. 601 at 10–11; *Bio-Rad Lab'ys, Inc. v. 10X Genomics Inc.*, 967 F.3d 1353, 1378 (Fed. Cir. 2020) ("In considering the balance of hardships, courts may consider the 'parties' sizes, products, and revenue sources.' '[E]xpenses incurred in creating the infringing products' and 'the consequences . . . of its infringement, such as the cost of redesigning the infringing products' are 'irrelevant.'"). They also argue that the limited amount of time remaining before the asserted patents expire—six months for the '973 Patent, the only patent asserted against the CoolMPS—favors Defendants. *See Humanscale Corp. v. CompX Int'l Inc.*, 2010 WL 1779963, at *4 (E.D. Va. Apr. 29, 2010) **(**denying permanent injunction where "the balance of the hardships tip[ped] in favor of [the accused infringer] . . . because of the short life left on the [asserted] Patents," i.e., two months).

The Federal Circuit has held that the amount of time a patent has to run "is not a factor in favor of [the infringer] in the balance of equities. Patent rights do not peter out as the end of the patent term . . . is approached." *Atlas Powder Co. v. Ireco Chemicals*, 773 F.2d 1230, 1234 (Fed.

Cir. 1985); *see also RMH Tech, LLC v. PMC Indus.*, 352 F. Supp. 3d 164, 203 (D. Conn. Dec. 18, 2018) ("Patent rights are no less valid or enforceable if there is one day or one year or the entire term left in the life of the patent.") (citing *Atlas* Powder, 773 F.2d at 1234). That there are only six months left of the '973 Patent term is not a factor that weighs in favor of Defendants. The harm to Illumina by Defendants' continued willful infringement is greater than the minimal harm to Defendants.

D. Public Interest

"The fourth *eBay* factor requires the patentee to show that the public interest would not be disserved by a permanent injunction." *Apple*, 809 F.3d at 646 (internal quotation marks omitted). "[C]ourts have in rare instances exercised their discretion to deny injunctive relief in order to protect the public interest." *Rite-Hite Corp. v. Kelley Co.*, 56 F.3d 1538, 1547 (Fed. Cir. 1995). Although "the public often benefits from healthy competition . . . the public generally does not benefit when that competition comes at the expense of a patentee's investment-backed property right." *Id.* at 647. The "Patent Act's statutory right to exclude" and "the importance of the patent system in encouraging innovation" supports a conclusion that "the public interest nearly always weighs in favor of protecting property rights in the absence of countervailing factors, especially when the patentee practices his inventions." *Id.*

Defendants contend that "an injunction preventing the sale of CoolMPS in the United States would harm the public interest by depriving the public of a more accurate and less expensive sequencing technology than Illumina's." Dkt. No. 601 at 14. According to Defendants, CoolMPS is more accurate than Illumina as evidenced by a third-party study showing that CoolMPS "is nearly 5 times more accurate than Illumina." Dkt. No. 601-13 ("Zhang Study") at 20; Dkt. No. 601-14 ("Metzker Decl., Ex. 2 Fig. 9"); Dkt. No. 601-12 ("Metzker Decl.") ¶ 27. But the third-party study did not compare sequencing platforms; it focused on the sequencing of "DNA extracted from [specific] cells . . . to build a de novo assembly of eight genomic regions encoding four key components of the immune system." *See* Zhang Study, Abstract. It does not discuss any differences between the Defendants' and Illumina's platforms. *Id.* And the record undermines Defendants' claim—its own executives testified that CoolMPS is not a mature

product. *See* Dkt. No. 525-5 at 19 (J. Wang Trial Tr.) (testifying in September 2021 that the CoolMPS product "even now is still not mature"); Dkt. No. 539 at 492 (R. Dramanac Trial Tr.) (confirming that CoolMPS is not mature).

Defendants also contend that CoolMPS's greater accuracy is attributed to non-infringing features, e.g., CoolMPS uses rolling circle amplification instead of polymerase chain reaction like Illumina for its replication technique and CoolMPS uses novel antibodies, which speeds up the SBS method and increases the accuracy. Metzker Decl. ¶¶ 13, 15, 18–22. Even if this were true—and it is unclear that it is—it does not change the fact that CoolMPS's use of Illumina's patented technology is a central feature to its alleged success. Defendants also argue that "CoolMPS is substantially less expensive for researchers than the Illumina system" for reasons other than Illumina's patented technology. Dkt. No. 601 at 17. For example, the "nucleotides are less expensive to synthesize because they do not require a linker and the attachment of the fluorescent dye, and the brighter signals from antibodies carrying multiple dye molecules allow for more efficient imaging with simpler images." *Id.* The Federal Circuit, however, has rejected similar arguments because an infringer's "advantage of undercutting prices" by "avoid[ing] the costs and risks of research and development" inhibits innovation and therefore weighs against public interest. *Douglas Dynamics*, 717 F.3d at 1346.

For these reasons, the *eBay* factors weigh in favor of granting Illumina's motion for a permanent injunction.

E. Unclean Hands

Defendants contend that a permanent injunction is improper because Illumina's conduct gives it unclean hands. Dkt. No. 601 at 18–21; *Precision Instrument Mfg. Co. v. Auto. Maint. Mach. Co.*, 324 U.S. 806, 814 (1945) (acknowledging that the maxim "he who comes into equity must come with clean hands" "is a self-imposed ordinance that closes the doors of a court of equity to one tainted with inequitableness or bad faith relative to the matter in which he seeks relief, however improper may have been the behavior of the defendant."). Specifically, Defendants argue that "Illumina's claim to have not known about and copied Zavgorodny and Kovacs before filing the patent applications at issue here, despite evidence to the contrary" as well

as its alleged misrepresentations about the prior '537 Patent proceedings and '973 Patent disclosures establishes unclean hands. Dkt. No. 601 at 18.

Defendants' contention is unpersuasive. I have repeatedly rejected Defendants' first argument, the inequitable conduct theory, including at the summary judgment stage. Dkt. No. 424 at 24–25. As for the prior '537 Patent proceedings, I rejected Defendants' contention that Illumina improperly suggested that the Qiagen proceedings and Defendants' IPR proceedings were directed to more than one patent. *See supra* Part II.A.1.c. Defendants also contend that Illumina knew that these prior proceedings "were scientifically unsound" and "Illumina did not even try to address at trial." Dkt. No. 601 at 19. They say that the prior decisions relied on incorrect arguments about incomplete cleavage, but both the Patent Board in the first inter partes review ("IPR") and the jury rejected these arguments. *Id.* (citing Dkt. No. 540 at 581–84 and Dkt. No. 542 at 1040–52); TX0985; Dkt. No. 540 at 574–92.

Defendants also argue that the "record is rife with other claims that Illumina made to save its patents that have no basis." Dkt. No. 601 at 9. For example, Defendants contend that Romesberg improperly testified that the Parce reference did not disclose removing the blocking group with TCEP and that during his cross "he had to read the portion of Parce that said the exact opposite." *Id.* (citing Dkt. No. 542 at 1045–46, 1108). But the full context of Romesberg's response during cross shows that he did not misinterpret the Parce reference. Dkt. No. 542 at 1107–08 ("Q: So Parce actually says you can remove the blocking group with TCEP? A: In this case, we are defining 'blocking group' a very specific way; and all I can tell you is that the way we are discussing it here, Parce is not doing that . . . But the TCEP step leaves the phosphate. So in every way that we're discussing things here, that blocking group remains."). As for Defendants' contentions about Illumina's alleged misrepresentations regarding the '973 Patent disclosure, these have been rejected above. *See supra* Part II.A.1.c. There is no basis to establish that Illumina has unclean hands.

F. Scope of Injunction

Finally, Defendants assert that if I grant Illumina's motion for a permanent injunction, it should be narrowly tailored and unambiguous in scope. Dkt. No. 601 at 21. In particular,

Defendants seek clarification that (1) "[a]ny injunction should not preclude Defendants from offering the Accused Products for sale where such sales will occur after the expiration of the patents in suit, and should allow Defendants to immediately commence promoting, advertising, and marketing the Accused Products for sale after the patents expire"; and (2) "any injunction should not include research and development ("R&D") activities, as the jury's verdict accounts for an R&D license through the expiration of the patents." *Id.* at 21–22.

Illumina does not dispute that the scope of the injunction should not include Defendants' promotion, advertising, and marketing of the Accused Products for sale *after* the patents expire. Dkt. No. 612 at 13–15. But it improperly objects to Defendants' request that the injunction should exclude Defendants' offers for sale *before* the patents expire where the actual sale will take place *after* the expiration. *Id.* The plain language of 35 U.S.C. § 271(i) allows for offers for sale before the patents expire so long as the actual sale takes place after the expiration of the patent. *See* 35 U.S.C. § 271(i) ("an 'offer for sale' or an 'offer to sell' by a person other than the patentee, or any designee of the patentee, is that *in which the sale will occur before the expiration of the term of the patent*.") (emphasis added). Illumina also contends that enforcing Defendants' promotional activities to confirm that sales would be consummated only after the expiration of the patents-in-suit would be difficult and would invite wasteful dispute. Dkt. No. 612 at 13–14. That the only patent relevant to the CoolMPS will expire in August 2022, however, undermines Illumina's arguments. If Defendants make offers to sell Accused Products in the U.S. before the expiration of the patents-in-suit—as they are permitted—they must include the following conspicuous written disclaimer: "No sales will occur, and no purchase orders will be accepted, until after August 23, 2022." Such a disclaimer is not necessary for any promotion, advertising, and marketing of the Accused Products for sale after the patents expire.

Contrary to Defendants' other assertion, the jury's verdict does not account for an R&D license through the expiration of the patents. The jury instructions and the verdict form expressly state that the damages award is for Defendants' infringement from early 2014 to June 2020. *See* Final Jury Instructions ¶ 7 ("Accordingly, if you decide that Illumina is entitled to damages, the time period for the damages that may be awarded by you commences in early 2014 and ends in

June 2020."); Dkt. No. 550 ¶ 24 (jury verdict form asking, "What sum of money, if any, would fairly and reasonably compensate Illumina for Defendants' infringement from early 2014 through June 2020?"). In other words, because the jury's damages award is proper, the jury's verdict does not account for an R&D license through the expiration of the patents, *i.e.*, past June 2020. *See supra* Part II.D.

Accordingly, Illumina's motion for a permanent injunction is GRANTED. The permanent injunction includes R&D activities. But it excludes (1) the promotion, advertising, and marketing of the Accused Products for sale after the patents expire and (2) any offer to sell an Accused Product in the United States before the patents expire, where the actual sale will take place after the patents expire, so long as Defendants provide a conspicuous written disclaimer with any such offer.

IV. ATTORNEY FEES AND ENHANCED DAMAGES

Illumina moves for attorney fees[9] and enhanced damages because of the jury's finding of willful infringement and Defendants' unreasonable litigation conduct. Dkt. No. 576 at 1. Because this is not an exceptional case that warrants attorney fees and the *Read* factors weigh against enhancement of damages, Illumina's motion is DENIED.

A. Attorney Fees

Under 35 U.S.C. § 285, a "court in exceptional cases may award reasonable attorney fees to the prevailing party." 35 U.S.C. § 285. "An 'exceptional' case is one that stands out from others with respect to the substantive strength of a party's litigating position (considering both the governing law and the facts of the case) or the unreasonable manner in which the case was litigated." *SRI Int'l, Inc. v. Cisco Sys., Inc.*, 14 F.4th 1323, 1331 (Fed. Cir. 2021) (internal quotation marks omitted). "While a finding of willful infringement does not require a finding that

[9] Defendants contend that Illumina's motion for attorney fees is untimely because there has been no entry of judgment and under Federal Rule of Civil Procedure 54(d)(2)(B), a motion for fees may be filed no later than fourteen days after entry of judgment. The rule, however, does not require that a motion for fees be filed only after entry of judgment. Unlike the cases that Defendants rely on, there is no reason to delay this motion here. *See, e.g., Use Techno Corp. v. Kenko USA, Inc.*, No. 06-CV-02754 EDL, 2007 WL 3045996, at *2 (N.D. Cal. Oct. 18, 2007) (denying a motion to compel discovery and holding that there was no reason to resolve the motion for fees when the case was active on the court's docket).

a case is exceptional," the Federal Circuit has indicated "that the willfulness of the infringement by the accused infringer may be a sufficient basis in a particular case for finding the case 'exceptional' for purposes of awarding attorney fees to the prevailing patent owner." *Golight, Inc. v. Wal-Mart Stores, Inc.*, 355 F.3d 1327, 1340 (Fed. Cir. 2004) (internal quotation marks and citation omitted). "District courts may determine whether a case is 'exceptional' in the case-by-case exercise of their discretion, considering the totality of the circumstances." *Octane Fitness, LLC v. ICON Health & Fitness, Inc.*, 572 U.S. 545, 545 (2014). The party seeking fees under Section 285 is required to show their entitlement to fees by a preponderance of the evidence. *Id.* at 557–58.

Illumina asserts that it is entitled to attorney fees because of Defendants' willful infringement, the substantive strength of its positions, and Defendants' unreasonable litigation conduct. Dkt. No. 576 at 5–19. As established above, Defendants' infringement was willful. *See supra* Part II.B. Illumina points out that Defendants' infringement and invalidity positions were substantively weak, as evidenced by the jury's verdict rejecting a majority of Defendants' theories. *Id.* at 9–10. It asserts that Defendants' pursuit of its meritless infringement theory under the '984 Patent after the claim construction order left it with no basis to continue to assert infringement, supports an award of attorney fees. *Id.* at 11–12; *see* Dkt. No. 424 at 18 (order granting Illumina's motion for summary judgment on the non-infringement of the '984 Patent). Illumina also argues that Defendants' inequitable conduct theories—which were rejected during the pleadings stage, summary judgment, and motions in limine—were frivolous and only served to increase the cost of litigation and waste judicial resources. Dkt. No. 576 at 13–16. Moreover, in Illumina's view, Defendants' discovery conduct unreasonably expended resources on unnecessary disputes, as evidenced by the fact that Illumina was forced to file nine discovery motions, eight of which were largely decided in its favor. *Id.* at 16–19.

Although I uphold the jury's verdict of Defendants' willful infringement, this is not an "exceptional" case that warrants attorney fees given the totality of the circumstances. *See SiOnyx LLC v. Hamamatsu Photonics K.K.*, 981 F.3d 1339, 1355 (Fed. Cir. 2020) (finding no error where "despite the jury's finding of willful infringement, the district court concluded that [defendant's]

noninfringement and invalidity defenses were not so weak as to be exceptional"). Contrary to Illumina's characterization of the case as Defendants' pursuit "to copy Illumina's patented sequencing chemistry without a good faith defense," Dkt. No. 609 at 1, this case was closely contested and resulted in a split verdict after five days of jury deliberation. Dkt. No. 600 at 1.

Defendants' positions were also not as weak as Illumina asserts given that they succeeded on two of the three patents asserted against CoolMPS, the only accused product relevant to the intended U.S. commercial launch—i.e., the noninfringement of the '025 Patent and the invalidity of the only asserted claim of the '444 Patent. *Id.* Moreover, Defendants' pursuit of their rejected theories was reasonable given that the conclusions were not straightforward. For example, on invalidity, the jury found some of the Asserted Claims were invalid. *Id.* at 9–10. On Defendants' '984 Patent infringement theory, there were close questions during claim construction and summary judgment. *Id.* at 10–13. For Defendants' pursuit of their inequitable conduct theories, it "was consistent with [their] aggressive defense[s] but was not otherwise uncommon or exceptional." *SiOnyx*, 981 F.3d at 1355. And given the extensive discovery in this case as well as Defendants' successful discovery motions against Illumina, Defendants' discovery conduct was not so unreasonable to warrant attorney fees.

Accordingly, Illumina's motion for attorney fees is DENIED.[10]

B. Enhanced Damages

Under 35 U.S.C. § 284, "the court may increase the damages up to three times the amount found or assessed." 35 U.S.C. § 284. "Awards of enhanced damages under the Patent Act over the past 180 years establish that they are not to be meted out in a typical infringement case, but are instead designed as a 'punitive' or 'vindictive' sanction for egregious infringement behavior." *Halo Elecs., Inc. v. Pulse Elecs., Inc.*, 579 U.S. 93, 103–04 (2016). "The sort of conduct warranting enhanced damages has been variously described . . . as willful, wanton, malicious,

[10] Illumina requests that if I deny its motion that I award it fees at least with respect to its litigation of the '984 Patent, direct infringement, Defendants' inequitable conduct defense and its violation of my order on Illumina's motion in limine no. 2, and their failed discovery motions. Dkt. No. 576 at 19 n.7. But if Illumina is entitled to fees on these grounds then Defendants are also entitled to fees for Illumina's losses. Dkt. No. 600 at 1. Because the nature of this case does not warrant attorney fees, Illumina's request is DENIED.

bad-faith, deliberate, consciously wrongful, flagrant, or—indeed—characteristic of a pirate." *Id.* As with attorney fees, "[a]lthough willfulness is a component of enhancement, an award of enhanced damages does not necessarily flow from a willfulness finding." *SRI Int'l*, 14 F.4th at 1330.

"Discretion remains with the district court to determine whether the conduct is sufficiently egregious to warrant enhanced damages." *Id.* To determine whether the conduct warrants enhancement, courts may consider the nine factors outlined in *Read Corp. v. Portec, Inc.*, 970 F.2d 816, 827 (Fed. Cir. 1992), *abrogated in part on other grounds by Markman v. Westview Instruments, Inc.*, 517 U.S. 370 (1996): (1) whether the infringer deliberately copied the ideas or design of another; (2) whether the infringer, when he knew of the other's patent protection, investigated the scope of the patent and formed a good-faith belief that it was invalid or that it was not infringed; (3) the infringer's behavior as a party to the litigation; (4) defendant's size and financial condition; (5) closeness of the case; (6) duration of defendant's misconduct; (7) remedial action by the defendant; (8) defendant's motivation for harm; and (9) whether defendant attempted to conceal its misconduct. To be clear, courts are not required to discuss the *Read* factors. *Presidio Components, Inc. v. Am. Tech. Ceramics Corp.*, 875 F.3d 1369, 1382 (Fed. Cir. 2017). "The *Halo* test merely requires the district court to consider the particular circumstances of the case to determine whether it is egregious." *Id.* at 1383. As a result, I will use the *Read* factors as general guidance.

In this case, the first, sixth, seventh, and eighth *Read* factors weigh in favor of enhanced damages. As established above, under the first *Read* factor, Defendants deliberately copied Illumina's technology. *See supra* Part II.B. The sixth and seventh *Read* factors also weigh in favor of enhancement because Defendants' infringement with respect to StandardMPS was ongoing since 2014 until the preliminary injunction was entered on June 13, 2020. Dkt. No. 576 at 23. Similarly, Defendants did not take remedial action after the complaint in *Illumina II* was filed in February 2020 and instead they continued to work towards the commercial launch of CoolMPS until the preliminary injunction in June 2020. Dkt. No. 576 at 24. Further, the eighth *Read* factor weighs in favor of enhancement because Defendants sought to launch CoolMPS in the

United States, which copied Illumina's technology. Although one court in this district has held that "[s]imply because a company seeks to gain a business advantage . . . does not mean that the company has a motivation to harm," *Power Integrations, Inc. v. Fairchild Semiconductor Int'l, Inc.*, No. 09-CV-05235-MMC, 2017 WL 130236, at *5 (N.D. Cal. Jan. 13, 2017) (internal quotation marks omitted), another court in this district has concluded that where there was "evidence that the infringer used a copied design in order to avoid using a less desirable alternative," as there is here, *Power Integrations* is inapposite. *Apple Inc. v. Samsung Elecs. Co.*, 258 F. Supp. 3d 1013, 1036 (N.D. Cal. 2017).

That said, the rest of the *Read* factors weigh against enhanced damages or are neutral. For the second and fifth *Read* factors, Defendants pursued strong theories of invalidity and non-infringement, resulting in the closeness of the case. *See supra* Part IV.A. Illumina asserts that the second factor weighs in favor of enhancement, because Defendants did not have a good-faith belief that StandardMPS did not infringe all of the Asserted Patents or that the Asserted Patents were invalid. Hearing Tr. at 37–38. Although the '537 Patent was repeatedly upheld as not invalid in prior proceedings, Defendants brought a different invalidity defense during trial. *Id.* at 40–42. In addition, the jury found one of the Asserted Patents against StandardMPS, the '444 Patent to be invalid. Therefore, Defendants had a good-faith belief to pursue its invalidity defense regarding StandardMPS. Defendants also had a good-faith belief to pursue its non-infringement and invalidity defenses regarding CoolMPS. *See supra* Part IV.A.

Further, Defendants' litigation conduct under the third *Read* factor does not rise to the level of egregious behavior. *Id.* As Defendants are a large, financially successful company, the fourth *Read* factor does not disfavor enhanced damages against Defendants. This factor is neutral. *See, e.g., Power Integrations, Inc. v. Fairchild Semiconductor Int'l, Inc.*, 2019 WL 3290369, at *9 (D. Del. July 22, 2019). Finally, the ninth *Read* factor weighs against enhancement. Illumina asserts that Defendants attempted to conceal its infringement when Illumina sent an email in 2015 asking if Defendants' new platform was based on SBS. TX696 (Yongwei Zhang suggesting internally that Defendants' response to Illumina should state that its platform is "based on CG core technologies"); TX0713 (a 2016 email where one of Defendants' employees suggests not

publishing any English-language marketing materials, pending the resolution of IP issues with Illumina). But these emails concern conduct outside of the U.S., an international launch of a product related to StandardMPS chemistry; emails about the launch of such a product does not constitute concealment of misconduct. In sum, Defendants' conduct is not sufficiently egregious to warrant enhanced damages and therefore Illumina's motion for enhanced damages is DENIED.

V. PREJUDGMENT INTEREST

Finally, the parties dispute whether Illumina should receive prejudgment interest, and if so, the amount of the award. Dkt. Nos. 574, 595. Under 35 U.S.C. § 284, "[u]pon finding for the claimant the court shall award the claimant damages adequate to compensate for the infringement . . . together with interest and costs as fixed by the court." Awarding prejudgment interest to a prevailing patentee is "the rule, not the exception." *Crystal Semiconductor Corp. v. TriTech Microelectronics Int'l, Inc.*, 246 F.3d 1336, 1361 (Fed. Cir. 2001). The purpose of a prejudgment interest award in this context is to "compensate[ ] the patent owner for the use of its money between the date of injury and the date of judgment." *Oiness v. Walgreen Co.*, 88 F.3d 1025, 1033 (Fed. Cir. 1996). "In the typical case, an award of prejudgment interest is necessary to ensure that the patent owner is placed in as good a position as he would have been in had the infringer entered into a reasonable royalty agreement." *Gen. Motors Corp. v. Devex Corp.*, 461 U.S. 648, 655 (1983). "[P]rejudgment interest should be awarded under [35 U.S.C.] § 284 absent some justification for withholding such an award." *Id.* at 657.

District courts have discretion to determine the rate of prejudgment interest. *Uniroyal, Inc. v. Rudkin–Wiley Corp.*, 939 F.2d 1540, 1545 (Fed. Cir. 1991). "Courts may use the prime rate, the prime rate plus a percentage, the U.S. Treasury Bill rate, state statutory rate, corporate bond rate, or whatever rate the court deems appropriate under the circumstances." *Apple, Inc. v. Samsung Elecs. Co.*, 67 F. Supp. 3d 1100, 1121 (N.D. Cal. Sept. 8, 2014) [Koh, J.]. In addition to determining the appropriate rate of prejudgment interest, the court must also determine whether to award simple or compound interest. *Rite–Hite Corp. v. Kelley Co.*, 56 F.3d 1538, 1555 (Fed. Cir. 1995). This matter is also "largely within the discretion of the district court." *Id.*

Contrary to Defendants' assertion, it is appropriate to resolve Illumina's request for

prejudgment interest at this time despite Defendants' intent to appeal if their motions for JMOL and a new trial are denied. Dkt. No. 595 at 1. Defendants' reliance on *Apple, Inc. v. Samsung Electronics* is misplaced. There, the court held that because "both parties have indicated that they may challenge the legal sufficiency of the jury's award, it will be more efficient to calculate prejudgment interest after appeal, when the final amount of the judgment is known." *Apple*, 67 F. Supp. at 1122. Although the court deferred the request for a *calculation* of the prejudgment interest, it granted the plaintiff's request for "prejudgment interest at the 52–week Treasury Bill rate, compounded annually." *Id.*

Likewise, in this case, it is appropriate to resolve Illumina's request at this juncture but defer the final calculation of the prejudgment interest until after appeal. In fact, to decline to do so would create procedural problems because there would be no final judgment until I resolve Illumina's motion. *See Halo Elecs., Inc. v. Pulse Elecs., Inc.*, 857 F.3d 1347, 1351–52 (Fed. Cir. 2017) ("The district court never resolved the parties' dispute regarding the date from which to begin calculating prejudgment interest or set the amount of prejudgment interest to be awarded to Halo. As a result, there is no final decision because the district court has not 'determine[d], or specif[ied] the means for determining the amount' of prejudgment interest.") (citations omitted).

Defendants also assert that Illumina is not entitled to prejudgment interest because its damages theory did not account for the time value of money and therefore the jury award has adequately compensated Illumina for any delayed use of the royalty. Dkt. No. 595 at 2–3. According to Defendants, because Dr. Prowse ignored the time value of money when he testified at trial—i.e., he did not discount the 2016–2020 R&D expenditures to 2014 dollars when determining the lump sum royalty that would have been paid in 2014—Illumina "presented an inflated damages number." *Id.* at 2. Defendants argue that Illumina "seeks to double count the time value of money by *excluding* it from its damages theory but *including* it for purposes of prejudgment interest" and therefore "there is no need to further compensate Illumina for the delayed use of this royalty with prejudgment interest as this compensation would be baked into the royalty number." *Id.* at 2–3 (emphases in original).

This argument is unpersuasive. It is well-established that awarding prejudgment interest to

a prevailing patentee is "the rule, not the exception." *Crystal Semiconductor Corp.*, 246 F.3d at 1361. And where, as here, the "jury awards a lump-sum amount as compensation for infringement, the prejudgment interest is properly applied to the entire amount beginning on the first date of the infringement." *Schwendimann v. Arkwright Advanced Coating, Inc.*, 959 F.3d 1065, 1076 (Fed. Cir. 2020). Both Illumina and Defendants' experts presented damages theories of an up-front, lump-sum to be paid at the time of the 2014 hypothetical negotiation and neither theory attempted to quantify the interest owed to Illumina. Dkt. No. 607 at 3. Illumina is therefore entitled to a prejudgment interest to compensate it "for the use of its money between the date of injury and the date of judgment." *Oiness*, 88 F.3d at 1033. In other words, "even if the jury had improperly disregarded the time value of money, an award of prejudgment interest should still be awarded to account for the risk of default." Dkt. No. 607 at 4.

The question then is the rate of the prejudgment interest. Illumina seeks prejudgment interest at the prime rate, compounded quarterly. Dkt. No. 574 at 4. Defendants seek prejudgment interest at the Treasury Bill rate, compounded annually. Dkt. No. 595 at 3–6. Courts in this district have awarded the prime rate where it was the "most accurate estimate of the interest rate the patentee would have charged the infringer for a loan" because, for example, the prime rate is the "rate charged by banks to its most credit-worthy customers." *Fresenius Med. Care Holdings, Inc. v. Baxter Int'l, Inc.*, No. 03-CV-1431-SBA, 2008 WL 928535, at *3 (N.D. Cal. Apr. 4, 2008). "[I]t is not necessary that a patentee demonstrate that it borrowed at the prime rate in order to be entitled to prejudgment interest at that rate." *Uniroyal, Inc. v. Rudkin-Wiley Corp.*, 939 F.2d 1540, 1545 (Fed. Cir. 1991). But courts have declined to use the prime rate where the plaintiff does "not present any evidence that it needed to borrow money because it was deprived of the damages award." *Apple*, 67 F.Supp.3d at 1122; *Laitram Corp. v. NEC Corp.*, 115 F.3d 947, 955 (Fed. Cir. 1997) (finding that the prime rate may not be appropriate if there is no evidence that the patentee "borrowed money at a higher rate, what that rate was, or that there was a causal connection between any borrowing and the loss of the use of money awarded as a result of [ ] infringement").

Illumina has not presented evidence suggesting that it needed to borrow money because it was deprived of the damages award and it does not dispute that it has substantial cash reserves,

which suggests that it would not have needed to borrow any money. Dkt. No. 595 at 4; Dkt. No. 595-2 (Illumina's 10-K for the fiscal year ending on December 29, 2013, i.e., at the time of the hypothetical negotiation in early 2014, shows that it "had approximately $711.6 million in cash and cash equivalents."); *Apple*, 67 F.Supp.3d at 1122 (awarding the Treasury Bill rate in part because Apple "maintains substantial cash reserves and has not presented any evidence that it needed to borrow money because it was deprived of the damages award."). The prime rate, however, would be the "most accurate estimate of the interest rate" for Illumina as a large company. *Fresenius*, 2008 WL 928535, at *3. Moreover, the Treasury Bill rate would be "inappropriate" in this case as it would "result in a windfall profit for the wrongful interloper," especially now when Treasury Bill rates are historically low, at "nearly zero" rates. *Pavo Sols. LLC v. Kingston Tech. Co., Inc.*, 2021 WL 1912392, at *2 (C.D. Cal. Mar. 16, 2021).

As a result, I grant Illumina prejudgment interest at the prime rate. *See, e.g.*, *Fujifilm Corp. v. Motorola Mobility LLC*, 182 F. Supp. 3d 1014, 1043–44 (N.D. Cal. 2016) (awarding prejudgment interest at the prime rate despite contentions that the patentee had substantial cash reserves and had provided no evidence that it had borrowed money at any rate because "the prime rate more nearly approximates the position [the patentee] would have been in had [the patent challenger] entered into a reasonable royalty agreement."). But I am "unconvinced that quarterly compounding is necessary" to fully compensate Illumina.[11] *See Verinata Health, Inc. v. Ariosa Diagnostics, Inc.*, No. 12-CV-05501-SI, 2018 WL 4849681, at *2 (N.D. Cal. Oct. 4, 2018); *Gyromat Corp. v. Champion Spark Plug Co.*, 735 F.2d 549, 557 (Fed. Cir. 1984) ("the determination whether to award simple or compound interest [ ] is a matter largely within the discretion of the district court."). Further, Illumina's request for prejudgment interest on the

[11] Illumina cites out-of-district cases to contend that quarterly compounding is the "ordinary approach to interest calculation" and a reasonable "middle ground" between continuous and annual compounding. Reply at 8 (citing *Milwaukee Elec. Tool Corp. v. Snap-On Inc.*, 288 F.Supp.3d 872, 909 (E.D. Wis. 2017)). To the contrary, courts in this district have regularly awarded annual compounding. Illumina does not oppose an award of annual compounding. *See* Mot. at 6, n.3 ("[a]lternatively, should the Court disagree that quarterly compounding is warranted, then annual compounding should be awarded.").

award of attorney fees is denied given that I denied Illumina's motion for fees. *See supra* Part IV.A. Accordingly, I award Illumina prejudgment interest at the prime rate, compounded annually from the date of Defendants' hypothetical lump-sum royalty payment in early 2014. I will calculate the pre-judgment interest after appeal when the final amount of the judgment is known.

VI. ADMINISTRATIVE MOTIONS TO SEAL

The parties have filed eight administrative motions to file under seal. Dkt. Nos. 575, 577, 598, 602, 603, 604, 608, 611. A party seeking to seal court records must overcome a strong presumption in favor of the public's right to access those records. *See Ctr. for Auto Safety v. Chrysler Grp., LLC*, 809 F.3d 1092, 1096 (9th Cir. 2016), *cert. denied sub nom. FCA U.S. LLC v. Ctr. for Auto Safety*, 137 S. Ct. 38 (2016). Accordingly, when a party seeks to seal judicial records connected to motions—such as the ones at issue here—that are "more than tangentially related to the underlying cause of action," it "must demonstrate that there are 'compelling reasons' to do so." *Id.* at 1096–99. The Ninth Circuit has explained that examples of "compelling reasons" include "the use of records to gratify private spite, promote public scandal, circulate libelous statements, or release trade secrets." *Kamakana v. City & Cty. of Honolulu*, 447 F.3d 1172, 1179 (9th Cir. 2006). Other examples include "sources of business information that might harm a litigant's competitive standing." *Ctr. for Auto Safety*, 809 F.3d at 1097. The administrative motions are granted and/or denied for the reasons in the table below.

Document	Portion(s) Sought to be Sealed	Designating Party	Ruling
Dkt. No. 575 - GRANTED			
Plaintiffs' Motion for Attorney Fees and Enhanced Damages	Highlighted Portion	Defendants	**GRANTED** (Discusses Defendants' confidential R&D expenses. Dkt. No. 589 ¶ 7).
Exhibit 14 – TX0309	Entirety	Defendants	**GRANTED** (Defendants' confidential intercompany agreements that detail financial and

			technical aspects of its R&D expenses. Dkt. No. 589 ¶ 7.)
Exhibit 15 – TX1259	Entirety	Defendants	**GRANTED** (Defendants' confidential intercompany agreements that detail financial and technical aspects of its R&D expenses. Dkt. No. 589 ¶ 7.)
Dkt. No. 577 – GRANTED in part and DENIED in part			
Plaintiffs' Notice of Motion and Motion for Entry of a Permanent Injunction	Highlighted portions	Defendants	**GRANTED** (Discusses Defendants' confidential efforts to develop alternative blocking groups. Dkt. No. 591 ¶ 7.)
Exhibit 3 – Excerpts from the Deposition Transcript of Jia Sophie Liu, Ph.D., dated December 15, 2020.	Entirety	Defendants	**DENIED – The clerk shall UNSEAL Dkt. No. 577-6.** (Defendants do not seek to seal this document. Dkt. No. 591 ¶ 3.)
Exhibit 5 – Excerpts from the Deposition Transcript of Xun Xu, dated July 9, 2021.	Entirety	Defendants	**DENIED – The clerk shall UNSEAL Dkt. No. 577-8.** (Defendants do not seek to seal this document. Dkt. No. 591 ¶ 3.)
Exhibit 6 – Excerpts from the Deposition Transcript of Handong Li, Ph.D., dated March 2, 2021.	Entirety	Defendants	**GRANTED** (Discusses Defendants' confidential efforts to develop alternative blocking groups. Dkt. No. 591 ¶ 7.)
Exhibit 7 – Excerpts from the Deposition Transcript of Jingjing Wang Ph.D., dated March 25, 2021.	Entirety	Defendants	**GRANTED** (Discusses Defendants' confidential efforts to develop alternative blocking groups. Dkt. No. 591 ¶ 7.)

Exhibit 8 – Excerpts from the Deposition Transcript of Handong Li, Ph.D., dated June 2, 2021.	Entirety	Defendants	**GRANTED** (Discusses Defendants' confidential efforts to develop alternative blocking groups. Dkt. No. 591 ¶ 7.)
Exhibit 9 – Excerpts from the Deposition Transcript of David Smith, Ph.D., dated April 20, 2020.	Entirety	Defendants	**DENIED – The clerk shall UNSEAL Dkt. No. 577-16.** (Defendants do not seek to seal this document. Dkt. No. 591 ¶ 3.)
Exhibit 10 – Excerpts from the Deposition Transcript of Honglin Zhao, dated April 29, 2020	Entirety	Defendants	**DENIED – The clerk shall UNSEAL Dkt. No. 577-18.** (Defendants do not seek to seal this document. Dkt. No. 591 ¶ 3.)
Exhibit 12 – Exhibit 64 to the Deposition of Honglin Zhao. Email between Zhao and A. Chaturvedi, dated April 8-9, 2020.	Entirety	Defendants	**DENIED – The clerk shall UNSEAL Dkt. No. 577-20.** (Defendants do not seek to seal this document. Dkt. No. 591 ¶ 3.)
Dkt. No. 598 - DENIED			
Plaintiffs' Opposition to Defendants' Motion for a New Trial	Highlighted portions	Defendants	**DENIED – The clerk shall UNSEAL Dkt. No. 598-4.** (Defendants do not file a responsive declaration and the material does not appear to be sealable.)
Exhibit 1 - Excerpts from the Deposition Transcript of Duncan Yu, dated July 07, 2021.	Entirety	Defendants	**DENIED – The clerk shall UNSEAL Dkt. No. 598-6.** (Defendants do not file a responsive declaration and the material does not appear to be sealable.)
Exhibit 2 - Excerpts from the Deposition Transcript of Xun Xu,	Entirety	Defendants	**DENIED – The clerk shall UNSEAL Dkt. No. 598-8.**

dated July 09, 2021.			(Defendants do not file a responsive declaration and the material does not appear to be sealable.)
Exhibit 3 - Excerpts from the Deposition Transcript of Honglin Zhao, dated April 17, 2020.	Entirety	Defendants	**DENIED – The clerk shall UNSEAL Dkt. No. 598-10.** (Defendants do not file a responsive declaration and the material does not appear to be sealable.)
Exhibit 4 - Excerpts from the Deposition Transcript of Jingjing Wang, dated March 25, 2021.	Entirety	Defendants	**DENIED – The clerk shall UNSEAL Dkt. No. 598-12.** (Defendants do not file a responsive declaration and the material does not appear to be sealable.)
Dkt. No. 602 – DENIED			
Exhibit 2 to the Declaration of Andrew Naravage in support of Defendants' Opposition to Plaintiffs' Motion for Attorney Fees and Enhanced Damages	Entirety	Plaintiffs	**DENIED – The clerk shall UNSEAL Dkt. No. 602-2.** (Illumina does not file a responsive declaration and the material does not appear to be sealable.)
Dkt. No. 603 – GRANTED			
Defendants' Opposition to Illumina Motion for Entry of a Permanent Injunction	Highlighted portions of page 4	Defendants	**GRANTED** (Discusses confidential marketing, product launch, and sales information. Dkt. No. 603-1 ¶ 6.)
Dkt. No. 604 – GRANTED			
Declaration of Dr. James Kearl in Support of Defendants' Opposition to Plaintiffs' Motion for Permanent Injunction	Highlighted portions	Plaintiffs	**GRANTED** (Discusses Illumina's confidential financial, sales, and pricing data. Dkt. No. 606 ¶ 9.)
Exhibit 3 to the Declaration of Dr.	Entirety	Plaintiffs	**GRANTED** (A third-party report

James Kearl in Support of Defendants' Opposition to Plaintiffs' Motion for Permanent Injunction			containing confidential information about market trends and forecasts, paid for by Illumina. Dkt. No. 606 ¶ 8).
Exhibit 2 to the Declaration of Andrew Naravage in Support of Defendants' Opposition to Plaintiffs' Motion for Permanent Injunction	Entirety	Plaintiffs	**GRANTED** (Discusses Illumina's confidential proprietary information related to an unreleased commercial product. Dkt. No. 606 ¶ 10.)
Dkt. No. 608 – GRANTED in part and DENIED in part			
Plaintiffs' Reply In Support of Motion for Attorney Fees And Enhanced Damages	Highlighted portions	Defendants	**DENIED – The clerk shall UNSEAL Dkt. No. 608-3.** (Defendants do not seek to seal this document. Dkt. No. 615 ¶ 3.)
Exhibit 18 - Excerpts from the Deposition of Snezana Drmanac, taken on March 16, 2021.	Entirety	Defendants	**DENIED – The clerk shall UNSEAL Dkt. No. 608-5.** (Defendants do not seek to seal this document. Dkt. No. 615 ¶ 3.)
Exhibit 19 - Excerpts from the Deposition of Radoje Drmanac, taken on February 4, 2021.	Entirety	Defendants	**DENIED – The clerk shall UNSEAL Dkt. No. 608-7.** (Defendants do not seek to seal this document. Dkt. No. 615 ¶ 3.)
Exhibit 20 - Excerpts from the Deposition of Brock Peters, taken on March 9, 2021.	Entirety	Defendants	**DENIED – The clerk shall UNSEAL Dkt. No. 608-9.** (Defendants do not seek to seal this document. Dkt. No. 615 ¶ 3.)
Exhibit 21 - Excerpts from BGI Interrogatory Responses dated April 7, 2021.	Entirety	Defendants	**DENIED – The clerk shall UNSEAL Dkt. No. 608-11.** (Defendants do not

			seek to seal this document. Dkt. No. 615 ¶ 3.)
Exhibit 24 - Excerpts from the Deposition of Chongjun Xu, taken on January 22, 2021 and August 5, 2021.	Entirety	Defendants	**DENIED – The clerk shall UNSEAL Dkt. No. 608-13.** (Defendants do not seek to seal this document. Dkt. No. 615 ¶ 3.)
Exhibit 26 – A document produced by BGI bates labeled CGI001891278-CGI001891279 (TX1573)	Entirety	Defendants	**GRANTED** (Discusses Defendants' confidential R&D activities including specific reagents and experiment results. Dkt. No. 615 ¶ 7.)
Dkt. No. 611 – GRANTED in part and DENIED in part			
Plaintiffs' Reply In Support Of Motion For Entry Of A Permanent Injunction	Highlighted portions	Defendants	**DENIED – The clerk shall UNSEAL Dkt. No. 611-3.** (Defendants do not seek to seal this document. Dkt. No. 616 ¶ 3.)
Exhibit 1 - Excerpts from the deposition transcript of David Smith, dated April 20, 2020.	Entirety	Defendants	**DENIED – The clerk shall UNSEAL Dkt. No. 611-5.** (Defendants do not seek to seal this document. Dkt. No. 616 ¶ 3.)
Exhibit 2 - Excerpts from the deposition transcript of Rade Drmanac, dated August 3, 2021.	Entirety	Defendants	**DENIED – The clerk shall UNSEAL Dkt. No. 611-7.** (Defendants do not seek to seal this document. Dkt. No. 616 ¶ 3.)
Exhibit 3 – Excerpts from the Deposition of Snezana Drmanac, dated March 16, 2021	Entirety	Defendants	**DENIED – The clerk shall UNSEAL Dkt. No. 611-9.** (Defendants do not seek to seal this document. Dkt. No. 616 ¶ 3.)

Exhibit 4 – Excerpts from the deposition of Dr. John D. Sutherland, dated April 15, 2020	Entirety	Defendants	**DENIED – The clerk shall UNSEAL Dkt. No. 611-11.** (Defendants do not seek to seal this document. Dkt. No. 616 ¶ 3.)
Exhibit 5 - Excerpts from the deposition of Charles Bao, Ph.D., dated March 19, 2021	Entirety	Defendants	**DENIED – The clerk shall UNSEAL Dkt. No. 611-13.** (Defendants do not seek to seal this document. Dkt. No. 616 ¶ 3.)
Exhibit 6 – Excerpts from deposition of Jian Wang, Ph.D., dated September 1, 2021	Entirety	Defendants	**DENIED – The clerk shall UNSEAL Dkt. No. 611-15.** (Defendants do not seek to seal this document. Dkt. No. 616 ¶ 3.)
Exhibit 7 - Exhibit 1002 to the deposition of Rade Drmanac, Ph.D., dated August 3, 2021	Entirety	Defendants	**GRANTED** (Discusses Defendants' confidential budgeting and business planning information. Dkt. No. 616 ¶ 7.)

CONCLUSION

For the reasons explained above, Illumina's motion for judgment as a matter of law is **GRANTED in part and DENIED in part.** Its motions for permanent injunction and prejudgment interest are **GRANTED.** Defendants' motions for judgment as a matter of law and a new trial as well as Illumina's motion for attorney fees and enhanced damages are **DENIED.**

IT IS SO ORDERED.

Dated: March 27, 2022

William H. Orrick
United States District Judge